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American Forestry

AUGUST 1911

THE FOREST RANGER
By E. R. JACKSON

LAND UTILIZATION
By FILIBERT ROTH

FORESTRY IN THE AMERICAN TROPICS
By JOHN GIFFORD

FORESTRY IN UNIVERSITY OF MONTANA

FORESTRY ORGANIZATIONS

LETTER OF FOREST RANGER

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EDITORIALS
and
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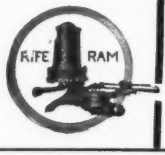

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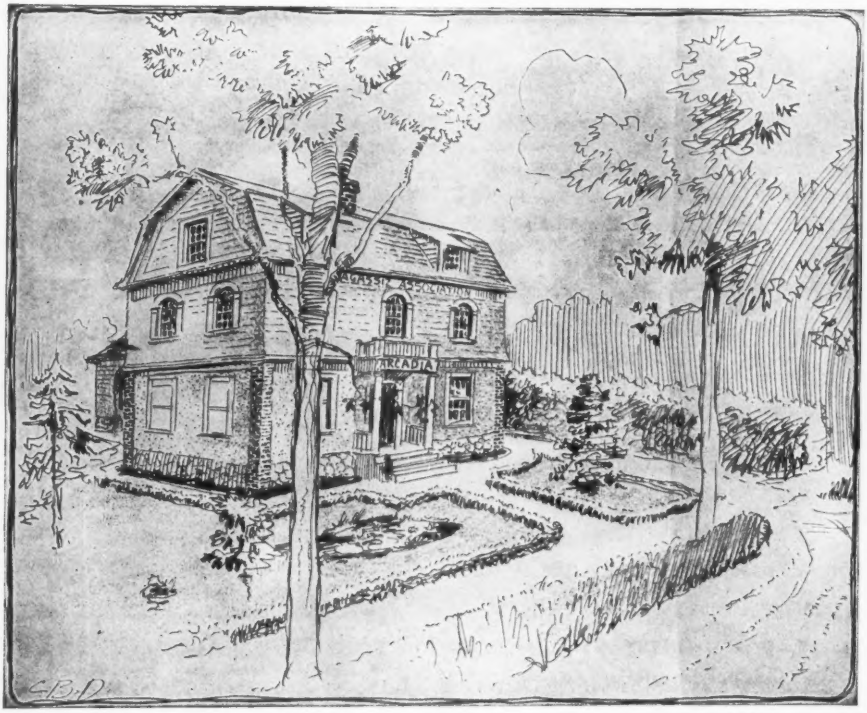

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SUPREME COURT OPINION
BY MR. JUSTICE HOLMES ON 6 APRIL, 1908

QUOTED BY
PRESIDENT ROOSEVELT, 13 MAY, 1908, AT WHITE HOUSE

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American Forestry

VOL. XVII AUGUST, 1911 No. 8

THE FOREST RANGER

By E. R. Jackson

PERHAPS the most picturesque figures in all the history of this country of ours are those bold dashing outriders of civilization, the pioneers and frontiersmen like Daniel Boone, Kit Carson and "Buffalo Bill." These men who have led the van of the westward moving army of settlers, going always just a little ahead, their lives just a little more wild and unrestrained than those of their fellow-men. But now with San Francisco just as near to the centers of civilization as Savannah, and Portland, Oregon, no harder to reach than Portland, Maine, we have at last reached a stage of development when our country no longer has any frontier. The tide of civilization, like the flood in the days of Noah, has slowly but surely swept across the continent from sea to sea and engulfed all but a few isolated spots lifted high above the world of man and guarded by Nature by rocky obstructions or impenetrable forests. But a few mountain fastnesses now afford safe retreats to the grizzly and the gray wolf. The savage no longer lurks in the forest to threaten the progress of the immigrant, and 'ere now most of the timbered hillsides have re-echoed with the blow of the ax or trembled at the shock of the miner's blast.

With the passing of the frontier there has gone as well the scout and the frontiersman. Even "Buffalo Bill" and the "Wild West" now suggest to us the stifling heat of a July day, the hustling, jostling crowds of the metropolis, the peanut and balloon venders, the big, free street parade followed by a magnificent performance in the main tent—with utter exhaustion and a feeling of intense relief when it is all over and the children are at last finally tucked away in bed.

So have times changed. The "forty-nine" played his little part in the drama of the West, then yielded the center of the stage to the scout and plainsman. Then came the cowboy, with his jingling spurs, his chaps, his ready gun. But even the cattle ranches, which furnished the setting for the cowman's stage, are now disappearing and in their places the prairies are being dotted with small farms. What then shall the cowboy do when the range has been converted into fruit farms and truck gardens? Will he be compelled to give up the freedom and picturesqueness of his life, to settle down at pulling weeds or drying prunes? Where is there a calling to which he may turn, that he may still preserve the traditions of the Golden West?

But one chance—one hope is left him—the life of the forest ranger. In days to come, when the trapper, the scout, the Indian fighter, even the cowboy are all dim memories, the forest ranger will remain the last embodiment of the Spirit of the West—the link which unites a glorious past to a practical present. Strange it seems to me, that the modern dramatist, who so constantly and eagerly is searching for material for new thrills which he may perpetrate upon the public, has not yet seized upon this bronzed fighter of forest fires as his subject. If I were a prophet, I should not hesitate to prophesy that within a few seasons we shall see some Edson or Faversham drawing upon himself the plaudits of the pit by his rendition of the ranger in some thrilling new play—some melodrama of the West. The forerunners of this drama have already appeared—the novelists have begun their work and already two or three books whose heroes are forest rangers are advertised at the book stalls; while writers in the special feature sections of the Sunday newspapers find in the life of the ranger material for unlimited copy.

To my mind, then, when Congress, on March 3, 1891, empowered the President of the United States to withdraw certain forest lands from settlement, and later in 1897,provided for the administration of these forest lands as national forests, not only was a new policy inaugurated as to the management of the forest resources of the Nation, but incidentally, a means was presented of preserving the fascinating and picturesque life of the pioneer and woodsman; for with the necessity of administering the national forests came the work of the forest ranger.

On January 1, 1911, there were in the United States and its territories, 152 national forests. In direct control of these forests are 140 supervisors; but the men who do the real work—"the men behind the guns" (sometimes literally)—in the national forests are the 1,200 rangers, whose duties we are to discuss for a few moments.

Although perhaps no other subject has been so much before the people of the United States during the last few years as forestry, yet the work of the rangers, and the reasons why we have such a body of men in Uncle Sam's service is perhaps not clearly understood by the average citizen. In a recent article in "Technical World," one writer has said:

" 'The new profession of forestry' has come to mean to the casual reader a sort of cross between a botanical excursion and a Sunday school picnic. The chief duty of the forest ranger is conceived to be to act as a sort of wet nurse to a lot of pine saplings. And because it is so foreign to American tradition to make a business of saving—rather than making and spending—the man in the street has come to regard forestry as something amateurish and foreign—a newly imported fad ranking with polo and the raising of ringed-tail pheasants as an amusement of the idle rich."

This, perhaps, is somewhat exaggerated, yet it is nevertheless true that in many sections of the country there is a serious misunderstanding both as to the duties imposed on the guardians of the national forests, and as to the real purpose for which these forests are maintained. I shall not have time to go into the latter question in detail—so large a subject requires treatment by itself—but that we may know why the national government has provided for the establishment of the national forests (which will give us the key to the ranger's duties) allow me to quote from the "Use Book," which is the official code of the forest officer:

"The national forests are created to preserve a perpetual supply of timber for home industries, to prevent destruction of the forest cover which regulates

the flow of streams, and to protect local residents from unfair competition in the use of forest and range. They are patrolled and protected at government expense for the benefit of the community and home builder."

And again, from a letter of the Secretary of Agriculture, addressed to the Forester, under date of February 1, 1903:

"In the administration of the forest reserves, it must be clearly borne in mind that all land is to be devoted to its most productive use for the permanent good of the whole people, not for the temporary benefit of individuals or companies. All the resources of the forest reserves are for *use*, and this use must be brought about in a thoroughly prompt and business-like manner, under such restrictions only as will insure the permanence of these resources."

We see, therefore, that these rangers who patrol the forests, are working for *Us*. It is their duty to see that these vast resources are not merely protected from wanton injury, but that such material as can be used without "waste to the inheritance" is made available for use—not by the monopolistic lumber king, but by the settler and local resident. It is the ranger who transacts the business of the forest, as to permits for the use of wood, or range, with the people of the community, hence it is important that the men who fill this important position be chosen with care. Let us, then, follow a candidate for the job, to see how he secures his position, and what his duties are after he has qualified.

The ranger secures his position by competitive examination under the Civil Service. Local residents are given preference in these examinations, in order to make sure that only men who are familiar with local conditions are employed. The tests are both written and by demonstration. Practical questions only are given and while experience is more desirable than mere book learning, yet the ranger must have sufficient education to be able to make maps and write intelligible reports upon forest business. It is also desirable that he know something about the elements of surveying, timber estimating and forest regulations. It is above all essential, however, that he know how to care for himself and his horses when far away from settlements. It is said that one candidate in reply to a question as to what provisions he would take with him for a three weeks' trip into the mountains in August began his list with twenty pounds of beef, which would probably spoil the second day out. Another, endeavoring to be thoughtful of his horse's welfare, listed 50 pounds of horse feed—when grass is never more succulent or easily found than in the mountain meadows in midsummer. But perhaps the demonstration tests are more important, and here is where our old friends, the cowboys, shine particularly bright, though they may be short indeed on book knowledge. The diamond hitch, the pack, the camp fire or the rifle have no terrors for these men who grow nervous at the feel of the penholder between their fingers. And in the end, the ranger must know more about horses and the wilderness than about books, if he is to be successful. He must show himself to be able-bodied, capable of enduring hard work and even privations. As the "Use Book" perhaps somewhat ironically says, "Invalids seeking light out-of-doors employment need not apply."

If the candidate is successful in passing the examination, he is given a six-months try-out as assistant forest ranger, and if he makes good, and is recommended by the supervisor at the end of this probationary period, he becomes a full-fledged ranger at a salary of $1,100 a year. The ranger provides his own outfit—horse, saddle and personal equipment. He is now ready to begin his job. He reports to the Supervisor of the Forest to which he is

assigned and is given a regular district to patrol. The 152 national forests, which are located almost exclusively in the West, include a total area of nearly 200 million acres. The average area per ranger is 104,000 acres or approximately 168 square miles. This is necessary because of insufficient funds to provide rangers to make possible a more efficient patrol.

The ranger's work lies almost entirely within the national forests. Seldom may he leave his territory, especially during the dry season when there is danger of fire. There he lives and works, seldom even taking his 15 days annual leave of absence.

It is the policy of the Government to provide the rangers with houses as fast as funds will allow. Many ranger stations have already been built where the ranger may live with his family, if he has a family. But sometimes, when no cabin has been provided, the ranger must build one himself. One ranger has taken advantage of a hollow Big Tree log and within it constructed his cabin. Others provide for themselves substantial cabins, where they may live comfortably in spite of storms and rains and winter snows.

Probably the first duty assigned to the new ranger is to make a trip over "his beat." So he packs his blankets, cooking utensils, shelter tent and other necessary equipment on a patient pack horse, mounts his saddle horse and rides away, to be gone perhaps a week, perhaps a month. Sometimes he goes alone, though occasionally some tourist will be his companion, or frequently in summer, technical assistants may go with him part of the time to make scientific studies in the forest.

The route of the ranger frequently leads him through scenery that is kaleidoscopic in its variation and beauty. His pathway often runs from the lowest gates of some vast canyon, through mountain meadows carpeted with aromatic blossoms that lift bright, communicative faces to greet the solitary passer-by, up along some mountain trail where beetling walls overhang on one side and a sheer precipice threatens on the other, until the uppermost limits of the forest are reached amid the snow-clad summits. Perhaps he may even ascend far above the clouds that hang about the lifted heads of the highest mountains and look out upon a billowy sea of mist illumined by the rays of the sun.

Sometimes the ranger allows his faithful horse to rest and skirts the shores of an Alpine Lake in boat or canoe. One ranger, in Montana, lives almost continually in his canoe, patrolling the shores of a large lake. In winter, the snow may be so deep that travel is impossible except by means of snowshoes and sledge.

But there is more for the ranger to do on his patrol trip than merely ride gaily through the greenwood like some knight of "merrier old England"; invariably he carries with him a hammer and a number of cloth signs warning campers against the danger of allowing their fires to get away from them.

If a sale of timber is contemplated, the ranger must mark the trees that may be cut, taking care to provide for thinning when necessary; for the removal of dying or mature trees where the stand needs to be replaced by young growth; and to get rid of defective trees as much as possible so as to provide room for the better young stand beneath them. If there has been a timber sale, he must see that the debris and brush is cleared up and properly piled so as to prevent the spread of possible fires. And when a still day comes, the brush thus piled is burned, so that it no longer is a menace to the forest. This is often done when snow is on the ground to insure greater safety, since then practically all danger of fire spreading is obviated.

Another task which requires great tact and much practical knowledge

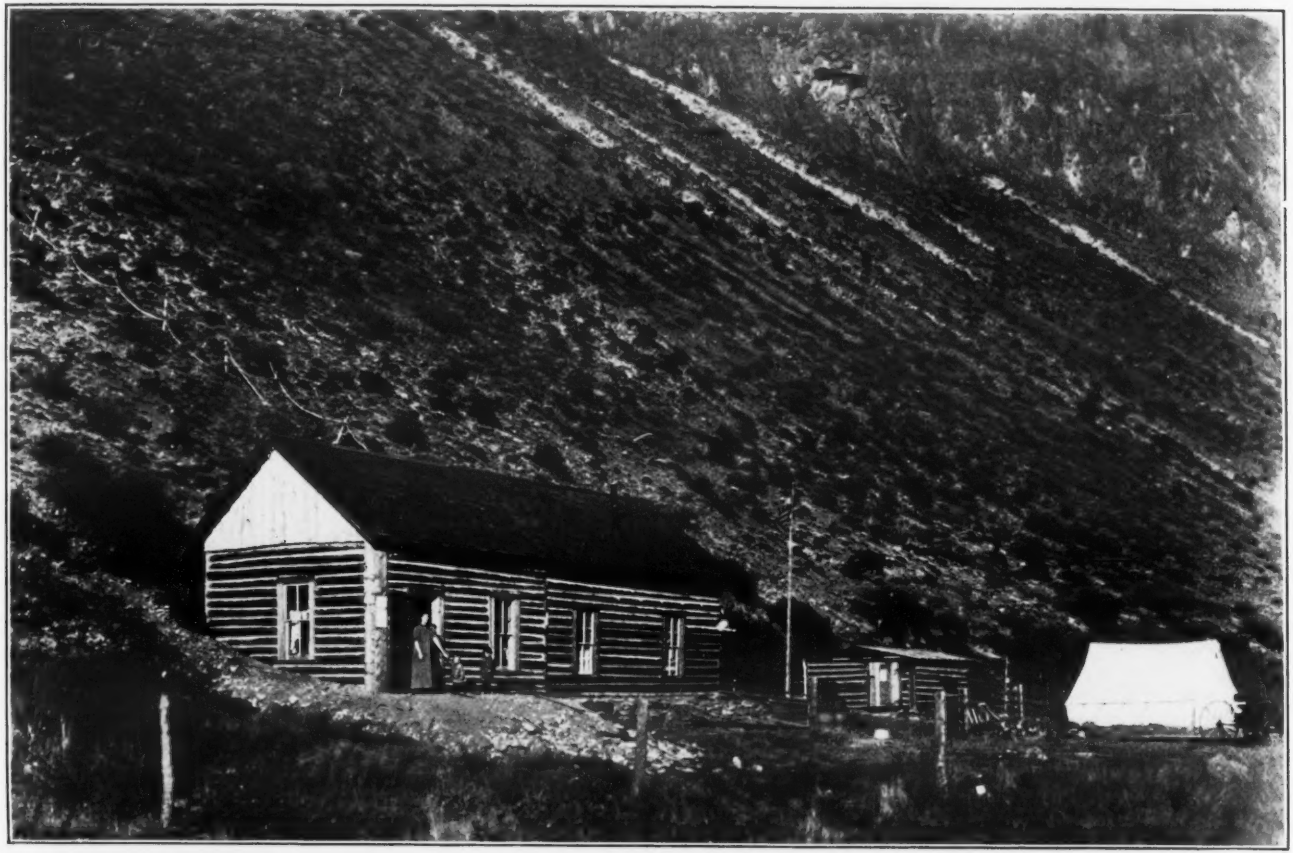
PLATE I. BRIDGE BUILDING, SHOSHONE NATIONAL FOREST, WYOMING

PLATE I. BRIDGE BUILDING, SHOSHONE NATIONAL FOREST, WYOMING

PLATE II. TELEPHONE CONSTRUCTION, FLATHEAD NATIONAL FOREST, MONTANA

PLATE III. TRAIL MARKING, COCONINO NATIONAL FOREST, ARIZONA

PLATE III. TRAIL MAKING, COCONINO NATIONAL FOREST, ARIZONA



THE FOREST RANGER

PLATE IV. HOME MAKING. RIO GRANDE NATIONAL FOREST, COLORADO

on the part of the ranger is the examination of claims of settlers within the national forest. If there are lands suited to agricultural purposes within the forests, they may be taken and cultivated just as other lands outside the forest. But, of course, many proposed claims are established, under the allegation of utilizing them for agriculture, when really the purpose is to secure the timber from them. These claims are, of course, rejected in the ranger's report to the supervisor. This perhaps explains why some of the western papers are filled with statements that the ranger is a stumbling block in the path of the western country toward progress and development.

Other users of the forests also come under the supervision of the ranger. Thousands of sheep graze within the forest ranges, but each owner must keep to his assigned territory and not run on a number of animals beyond that allowed in his permit. Cattle, too, are grazed under permit, and the old time war between sheep men and cattle men has been made impossible because the range is divided between them.

Many of the states in which the national forests are located have game laws, and the rangers are made game wardens to enforce these laws. Thus they are given police power to make arrests for illegal killing of game. On the other hand, one of their duties is to kill predatory animals, such as bears, coyotes and bobcats, which prey upon the sheep and other animals of the range. Special assistants are sometimes hired whose sole duty it is to hunt and trap these dangerous animals.

Thus the ranger lives and labors for weeks at a time, pitching his camp at night amid the fragrant pines and spruce trees. Each morning he is early astir, ready for a new day. And after weeks of travel, much of the time alone, he finally emerges from the forest, bronzed and bearded, but ready for whatever has turned up during his absence from headquarters.

But the ranger's life does not consist, as one disappointed novice put it, of merely "riding around under the trees and making outsiders toe the mark." There is hard manual labor to be done. There are stumps to be grubbed out to clear ground for nursery sites and ranger stations; routes for trails must be surveyed, not always over level land at that; and often this must be done in winter, in spite of cold and snow. Much heavy work is sometimes necessary to clear off these trails, which are absolutely necessary in order to make possible rapid travel in the forest in case of fire. The trails are sometimes actually cut from the mountain side.

Then there are bridges to be built across streams if these trails are to be worth anything and access given to valuable timber. These bridges are often temporary only, but sometimes more pretentious structures are erected. These trails and bridges form very valuable permanent improvements, and have added greatly to the value of the property in the national forests, not only by making accessible otherwise inaccessible places, but by reason of the increased facility with which fires may be reached and extinguished. By means of them, also, the sheep and cattle on the forest ranges are enabled to cross dangerous streams in safety.

Another form of permanent improvement in the national forests is the telephone lines that are being installed. They enable the ranger to get quickly into communication with the Supervisor's office if he needs help to fight fire, thus saving many a hard ride. The wires are often strung on the tree trunks, but where no suitable trees are available poles are set. Perhaps nothing has ever been done that renders a more efficient service in prevention of fires than this.

The forest fire furnishes the most strenuous and the most exciting part of the work of the forest ranger. During the hot, dry summer season, he

must be constantly on the watch for this, his arch enemy. Perhaps some still, hot day in Indian Summer, his route carries him to some high point where he can overlook a vast stretch of forest. As he pauses at the highest peak his quick eye detects what at first seems to be a thin rift of cloud far along the side of the mountains. He leaves his horse and clambors to a higher vantage point where he brings his field glass into play, for he must make sure whether this is smoke or mist. Should he misjudge, the consequences might be untold damage on one hand or a long, hard, useless ride on the other. When at last he has satisfied himself that the enemy is really at hand, he hesitates no longer. If he thinks he can cope with the situation alone he proceeds post haste to the site of the fire, and perhaps he may succeed in beating it out with his saddle blanket. Such fires are scarcely deemed worthy of mention in the ranger's diary and report.

But frequently it is not such an easy task, but one in which the ranger requires aid. If a telephone line is close by he calls the supervisor or the nearest ranger station for help, stating the location and extent of the fire. It has been said that the rangers constitute the greatest fire department in the world. But the ranger's equipment consists of no polished engines or towering ladder—it is often nothing more than a mustang pony and a pine bough or his saddle blanket. If the fire is a grass or surface fire in or near the forest, it has been found by experience that it can be fought effectively with the aid of common garden sprinklers, followed by a beating with wet sacks or blankets; shovels, axes, and heavy hose are necessary to combat the fiercer crown fires. A plan is now being adopted of placing boxes of tools such as these at convenient places ready for use when a fire breaks out. Armed with these tools, the fire fighters hasten to the fire and endeavor to check it before it grows too formidable, by cutting a lane or guard in front of its path across which it cannot leap. Sometimes backfiring is necessary, and then the ranger fights fire with fire, so that the two fires meet and die out for want of fuel. The common plan is to dig and scrape trenches around the fire, forcing it to a narrower and narrower front, and taking advantage of streams, trails, slopes, and other topographical features that may assist in checking the onrush of the flames. Not always are the fire fighters successful in checking the flames, but the men of the Forest Service have a remarkable record of efficiency in this respect. The Report of the Forester for 1910, contains the statement that of 3,138 fires reported, 2464 were extinguished by the rangers alone, without additional expense or aid.

A forest fire is a terrible menace. The lives of the rangers are constantly threatened and work under more trying circumstances can hardly be imagined. In the great fires of the Northwest last year, there were revealed heroes who need not blush in the presence of any battle-tried veteran of history. The story of Ranger Pulaski is typical.

Edward C. Pulaski, of Wallace, Idaho, was the ranger in charge of a gang of 40 fire fighters. When they found that the fire had gotten beyond their control Pulaski started to lead them to a place of safety, placing them in single file, himself in the lead. They had not gone far before they seemed to be surrounded by fire. The men grew panicky. Pulaski, himself, says that he saw columns of clear white flame spring up like will-o'-the-wisps, feeding on nothing but air. The smoke was so dense that the men had to hold one another to keep from getting lost. Their leader halted the apparently doomed men, soaked a gunny sack with water and dashed off through the fire and smoke to look for a way of escape. The men gave up hope, convinced that he would never return. But he did return and finally led them to an abandoned mine tunnel into which he ordered them. It seemed like condemning the

men to immediate suffocation. The mine timbers were on fire, and the tunnel was filled with smoke. Pulaski stood at the mouth of the tunnel, with drawn revolver and held the men back. In the gang of 40, there were but few Americans. These helped Pulaski control the the others, most of whom before long were lying on the ground gasping for breath, crying and praying. In five hours, the cave became a mad house. Now and then tortured men would rush upon the indomitable ranger, trying to get past him to the open, only to be hurled back and grimly ordered to lie down with faces close to the ground. That he was able to stand and fight men within and fire without for as long as he did is a miracle and sets a new sandard for American hardihood. At first it was thought that Ranger Pulaski would lose his sight, but prompt treatment in a hospital saved his eyes. Pulaski is a great-grandson of Count Pulaski, the polish exile of Revolutionary fame. He is the oldest male in direct line of descent and inheritor of the title of count—but Pulaski American forest ranger, does not care for that sort of thing.

Through the efforts of such men as Pulaski, the people of the United States are saved each year thousands of acres of valuable timber land that otherwise would be fire swept and worthless. But before fires can be altogether prevented, larger forces of rangers must be provided, and much work done in preparing permanent systems of fire protection. The bleached and deadened tree trunks which cover many a western mountain side are mute witnesses of the tardiness of our Government in giving needed protection to its forests.

It is a big task to think of attempting to reforest these burned areas, yet the Forest Service is making a beginning in this direction. The rangers, along with their other duties, gather each year hundreds of bushels of cones from which the seeds are taken and either sown broadcast or sown in seed beds in nurseries, and the seedlings thus produced, set out on steep slopes, unsuited to agriculture or beneath the chapparal or aspen that cover the burns where forests once stood.

Not much is yet apparent in the way of visible results, but the work is yet in its infancy and, doubtless, before long many a desolate spot will again be brightened and made useful by tree planting. The work of the ranger is a work that looks forward, and these humble servants of Uncle Sam are not easily discouraged. Skilled men are planning the work they do, and the laborers are worthy of their hire.

FORESTRY AND THE UTILIZATION OF LAND

By Filbert Roth

THAT newly cleared land is especially fertile is a fact well known to all farming people in all forested countries. Even the primitive people of India and the island regions of the Pacific have long known this fact and have practiced a simple form of agriculture by clearing (usually by burning) a piece of land, raising a few crops and then abandoning the old and clearing another piece. Even the most wretched sands of the Great Lakes region, of New England, or the South will produce a few crops after the forest has "built them up" to a reasonable degree of fertility.

From this great, wholesale experience, the world over, it follows that the forest not only can exist, and produce timber on lands, too poor for permanent agriculture, but also that it can improve impoverished lands. That this is a most important fact seems clear enough when we consider that less than one-fourth of the land of the United States is improved, that several hundred millions of acres are acknowledged to be non-agricultural and that many millions of acres more have been cleared and tried for farming and have been entirely abandoned and that today, many millions of acres are farmed at a loss, a loss to the poor farmer, a loss to the commonwealth. But this vast area of poor lands and lands in difficult situations represent an enormous capital, a most important, permanent asset. And surely it should be the earnest concern of the nation and the states to learn what is possible and feasible to keep these lands in some form of useful production to keep them habitable and to prevent their becoming useless, hopeless, and unsightly waste, detrimental to the surrounding country and to the state.

Barring the arid lands, it is the forest and forestry alone which have thus far proven of permanent value in keeping our poor lands in satisfactory productive conditions. And if we classify the value or importance of the forest to the nation, on the basis of

supply of timber;
utilization of non-agricultural lands; and
protection of watersheds;

it is perfectly fair to place the utilization of non-agricultural lands second, important as the third item is in our country.

It is clear that this great importance of the forest through the ability to utilize inferior lands, like its great influence on water distribution, is primarily of public importance; a matter of the state and nation and secondarily only one of the individual.

And it is all the more surprising that this feature has not been more emphasized even by writers on forestry matters. This is the more deplorable since our state and national legislatures have thus far refused to consider this importance of the forest and also since forestry has been attacked and successfully so, more from the standpoint of the utilization of lands than from all others combined. In Michigan, for example, we have more than one-fourth of all land in the form of cut and burned-over sandy pinery lands, of

ON THE LÜREBURGER HEATH. NEITHER GRASS NOR HEATHER AND ONLY TWO HOURS' RIDE FROM HAMBURG OR BREMEN AND FOUR HOURS FROM BERLIN

REFORESTATION OF THE HEATH

OAK WOODS NEAR HEILBRONN, WÜRTTEMBERG. IN DENSELY SETTLED AGRICULTURAL AND WINE GROWING COUNTRY

SCOTCH PINE NEAR BERLIN. THOUSANDS OF ACRES OF LARGE FORESTS NEAR THE BUSIEST CITY IN EUROPE. WHY NOT CLEAR THIS AND FARM? BECAUSE THEY HAVE TRIED IT AND IT DOES NOT PAY

SPRUCE PLANTATION ON RINGENBURG IN WÜRTTEMBERG, A FARM BELONGING TO THE SAME FAMILY FOR OVER 400 YEARS AND BOUGHT BY THE KING AT OVER $60 PER ACRE TO REFOREST

SPRUCE WOODS PAY BETTER THAN FARM CROPS. FOREST NEAR OBERNDORF IN BLACK FOREST; 140 YEARS OLD; WORTH OVER $2,500 PER ACRE FOR THE TIMBER CROP

SPRUCE WOODS IN BADEN BELONGING TO THE OLD NOBLE FAMILY OF FÜRSTENBERG

WHAT THE HEATH CAN DO. BEACH WOODS WITH SOME OAK AND SPRUCE BELONGING TO THE CITY OF NELZEN

which several million acres have drifted back into the hands of the state for non-payment of taxes, and of which thousands of acres have been settled and abandoned during the last forty years. The facts in the case are so thoroughly established by sad experience, that everybody knows about the pinery lands and their uselessness for agriculture. But a few interested land dealers and politicians are making money out of the traffic in these poor useless lands.

Theirs is a clear-cut dollar statesmanship which the legislature fully appreciates and the result is that today the state of Michigan sells these lands at about one to two dollars per acre, though they are worth ten dollars for forestry, and that the state established an Immigration Bureau to help along the bad work of advertising these lands.

Michigan is not alone. The Heyburn arguments in Congress are exactly of this same order.

The fact is clearly before our people. We have today in the United States many millions of acres of land which demand attention. We have the choice of allowing them to become waste lands, some of them hopeless, permanent waste, or of having them cared for and preserved or returned to a productive useful condition.

While thus in our country the states and people generally work to clear away the forest, the people of Europe, though they have more and better forests than we, have adopted the motto. Extension and improvement of the forest.

And it is quite a surprise to the traveler to find this extension and restoration of the forest in places where exactly the opposite might be expected.

Thus in Belgium, the most densely populated country in Europe, one sees beautiful forests of beech and spruce and in addition, one finds the state restoring worn out and abandoned sand lands by the thousands of acres and at great expense. These are not sand dunes along the coast, but large areas inland, and some of them only two hours' ride from Antwerp, one of the great markets and shipping places of the world.

Similar conditions occur in Germany. The Lüreburger Heath is a surprise to anyone interested in the material welfare of any country. A district settled before the beginning of our era is largely today an unused waste. It is neither grazing land nor field, sparsely populated, largely deserted. Here, too, the fallacy of "It is needed for agriculture," has borne its bitter fruit and the present and future generations have to expend millions to restore these vast areas to some kind of usefulness, for the experience of centuries has taught Europe that these waste lands are not only a waste but even a menace. They are the haunt and breeding ground of the "undesirable," of poverty, vice, and degradation. And if our politicians in the United States care to see and to learn, they need not go far to find similar conditions already existing here at home.

What the forest can do for just such lands is well illustrated by the fine stands of beech and pine and spruce in the city forest of Nelzen and other places.

In the vicinity of Berlin, one of the large and busy cities of the world, in the midst of the best markets to be found anywhere, we again find the pinery sands making people land-poor, abandoned, and finally restored to the only crop that will be permanent, the forest.

Four hours east of Berlin in the vicinity of Kreutz, in the same great North German plain the government has tried and is now trying every known remedy to aid in the development of the country. Large farms, up to 600 acres and more had gradually degenerated into waste land. The people were leaving the country to find work elsewhere. As a last resort the government

has bought the land from many of these farmers, either the entire farm or part of it. The prices even today range from $3 per acre up and averaged for the entire forest district only $8 per acre. The government now pursues two lines; agriculture and forestry. Every inducement is made to settlers, only the better land is turned over to them and easy payments, low rate of interest, long term loans, etc., all tempts the new comer. And yet, it is forestry which alone can cope with the major part of this situation. Thousands of acres are reforested every year.

But the most surprising cases one meets in the densely settled, highly improved and well wooded states of South Germany and in Switzerland. Old farms which have well supported their owners for centuries are converted into spruce woods. Old families who have rented their lands for centuries at fair rentals, find it profitable to quit renting and reforest. All through the well-settled farming parks of Switzerland one sees hundreds of spruce and hardwood plantations set out during the last 60 years. The chief forest inspector of Baden, a man of experience, expressed both his surprise and dissatisfaction at these changes. "When I was a young forest official it was almost a daily affair to have to refuse *a permit to clear* away the forest on certan lands. Today I have to counsel and plead with our people to keep them from planting up good farm lands."

But why is all this? Simply because the farmer is no longer willing to work for nothing and to go without the comforts of life. He considers farming as any other business is considered. Farm good land, where farming pays, and leave the rest to others and to other uses.

To us the lesson of the Old World is most significant. With a scarcity of timber before us; with most of our states now importers of timber at great expense, with food to export and food enough to waste more than we can eat, with all this clearly before us it is an unpardonable fallacy, nay a criminal neglect, that we should go on encouraging the destruction of forests and refuse to encourage their preservation and restoration.

THE STRENUOUS LIFE OF THE FOREST RANGER

GILBERT wrote "The policeman's lot is not a happy one," but the lot of Uncle Sam's forest policemen seems to be both happy and strenuous. What the work of a forest ranger actually means can probably be fully realized only by those who have lived long in the wilderness. The following extract from a narrative of personal experience in the spring of 1911 of two members of the Battlement Mesa National Forest reached AMERICAN FORESTRY and is published, because it affords a glimpse into the amount and variety of the work on a national forest to get ready for the busy season.

"The time of most of the men on the Battlement during January, February and March having been almost entirely taken up with grazing business, reseeding and forest investigation work, it became necessary in April to do such repair work on the stations and telephone lines as would put everything in working order for a busy coming field season. We have painting of roofs, ceilings, doors and windows, and oiling of floors to accomplish on two three-room cabins, one at the Park Creek and one at the Big Creek Ranger Station. These stations are located at altitudes of 8,500 and 8,750 feet above sea level, where the snow at this season was from four to five feet deep.

A telephone line 16 miles long connecting these two stations and thence from the Big Creek station to the Supervisor's office at Collbran, Colorado, had to be repaired. The line from the Park Creek to the Big Creek Ranger station traverses a country ranging from 8,500 to 10,000 feet in altitude. This line was in bad condition from the heavy snows in some places, long stretches being down and buried in the snow. We started carrying supplies on our backs and sometimes hauling it on roughly constructed sleds to our stations, early in April. From the lower snow line where we could go with pack horses to the stations is four to five miles, we found that a man could pack only about 50 pounds to a trip on skis, and it would take an entire day to cover the ten miles. We had bedding, food supplies, paint and oil, in five and one gallon cans, telephone wire, brackets, insulators and tools, aggregating 500 pounds per station. By using sleds part of the time we transported the entire load to the station in five days. The sleds were hurriedly constructed and pulled mighty heavy, oftentimes we could not pull them more than a few yards at a time without resting. The snow was generally soft and sometimes sticky enough to make it impossible to move the sleds while on our skis, without stopping to scrape the frozen snow off from the bottom of runners or skis and greasing them with tallow. When Supervisor Lowell saw the sleds and attempted to pull one he remarked that it would have been as well to have used the ranger station stove with the feet down for transporting the load.

When we arrived at the stations ice had to be shoveled off from the shingled roofs so that they would dry for painting. The weather was cold and we found it necessary to heat all paint and oil before applying it to the roof. Before painting was attempted we started out to repair the telephone line on skis, carrying with us the necessary wire, brackets, insulators and tools. One of us is an expert on telephone repairs, but a new beginner on skis. The other one had had considerable experience on skis and as a telephone pole and tree climber. We were three days repairing the 16 miles of line. In several places

we found it buried in six to ten feet of snow. In most of these places we could pull it out with stretchers attached to a tree or a pole, but in some instances it was frozen in so tight that the wire would break in the pulling operation and it became necessary to leave it buried to be picked up later when the snow goes off, so we had to replace it with new wire at this time. We found repairing telephone line on the skis mighty hard work, especially when it was all up hill. The long down hill slopes on our return to camp after the day's work had been completed, when the wind was our only competitor for speed made us forget all our troubles in climbing the last big hill. Disaster lurks in many places for the novice on skis, as was illustrated by a conversation over the line after it had been repaired, between one of us and the Supervisor. In response to our "Hello," the Supervisor said, "How are you?" The reply came, "One shoulder is knocked down and I have a couple of bog spavins on each leg, caused by an attempt to climb a spruce tree while coasting down a steep hill into Park Creek. Otherwise I am feeling fine." In another place the same man was coming down a steep slope going like the wind. He was loaded with tools and repair paraphernalia and at about the middle of the hill he suddenly struck a high snow bank and all that was left above the snow was his "Hello." Even the other fellow, old skier that he is, struck a bare spot one day in coming down a long grade resulting in a large hole in the soft earth and a broken nose on an otherwise smooth countenance.

At the Anderson Camp Ranger Station, one half way between Park Creek and Big Creek, which is a partially abandoned summer camp with a dirt roof on a three-room cabin and the center room entirely open in front, we found the snow piled high above the cabin, but a space was left about two feet wide between the open front room and the high snow bank. Through this crevice we climbed in and examined the telephone located in the cabin and made an effort to call up the office to test the line, but we found that although we had finished repairing the line it would not work so we separated, one of us going east and one of us west, to find the trouble. We latter found a tree had fallen on the line two miles west of Anderson Camp. After repairing the trouble we returned to the Park Creek Ranger Station.

We had skied all together about 20 miles this day and repaired three miles of badly delapidated line, arriving in camp at 8 P. M., having put in 14 hours for one day's work. We were tired, sure, but with an appetite that could not be beaten and after a good night's rest we were ready for the same stunt again. Our work in repairing this line and painting the cabins has been altogether a strenuous time, but after it was completed we felt fully compensated in the knowledge that the work in our busy time during the coming field season would be carried out with better success and efficiency."

TESTING TELEPHONE LINE AFTER CONSTRUCTING IT

THE WAY THE LINE IS CONSTRUCTED SOMETIMES

PILING AND BURNING BRUSH AS A PASTIME

REFORESTING BURNS IN CALIFORNIA NATIONAL FORESTS

ALMOST every one in California has heard or read about the devastating forest fires of last summer, but how many have heard of the efforts made by the Secretary of Agriculture to reforest these burns with valuable trees? Yet, hardly had the fires been put out and scarcely had the ashes cooled off, when tree planting was begun. Plans for this work were being made even while the fires were still burning.

A statement recently made by the District Forester in charge of the national forests in California shows that during the year 1910 the Forest Service planted or sowed a total of 2302 acres of land in this State. Of this area 282 acres was planted with 244,581 young trees, while the remainder was sowed with 6274 pounds of tree seed, mostly pine.

The 2,302 acres reforested last year is a small area compared with the total forest burned over, but when one considers the rough country covered, the lack of facilities for transportation, and the difficulty of getting in the trees and supplies, the showing made is quite creditable. In connection with this work 5,608 pounds of tree seed were collected from the forests in California, while over 2,000 pounds were purchased in other states, mostly in Colorado and South Dakota.

Most of the tree seed sowing in the forests of California was done by means of the so-called "seed-spot" method. A small plot of ground, usually 18 to 24 inches square, is dug up with a mattock, spade, or harrow so as to expose and loosen the mineral soil to a depth of several inches. From 12 to 15 seeds are then scattered evenly on this prepared plot and, after being firmed into the ground, they are lightly covered with dirt. These seed spots are located usually eight feet apart, making about 700 spots to the acre. By this method, even if only one seed out of each twelve germinates and grows into a tree, the land is fully reforested.

In many cases the ground was covered with a dense growth of burned chaparral and brush which would soon sprout and crowd out the young seedlings. In order to make the tree sowing a success it was found necessary to cut a certain amount of the brush around each seed spot. In a few cases direct broadcast sowing was tried, the seed being scattered as uniformly as possible over the land. This method is sometimes very successful in the spring, when the melting snow draws the seed into the ground.

No sooner was the sowing and planting work well under way than a serious drawback appeared in the form of numerous squirrels, chipmunks, mice and rats, which came from all directions to feed on the seed so attractively prepared for them. It was remarkable how quickly the animals would learn of the whereabout of the seed and the distance they would travel to get to this food supply. Burns hundreds and even thousands of acres in extent, with apparently not a sign of an animal on them would suddenly become alive with the little marauders. In a number of instances the animals would sit and wait expectantly until the seed was put into the ground. In some

cases 30 to 70 per cent of the seed was destroyed. One chipmunk was seen to visit 38 seed spots in four minutes. Further planting operations were useless unless some means could be discovered to check these rodents. Accordingly, several methods of treating the seed were tried. First, comparatively harmless solutions were applied to render the seed distasteful to the animals. This did not prove successful, because the rodents would hull the seed and get rid of the shell and the distasteful chemical at the same time. Consequently more deadly poisons were tried, but as yet no really effective means have been discovered of checking the ravages of the rodents. Experimentation along these lines is still being carried on.

The work of reforestation is slow, tedious, and costly. At best it will take many years before the trees now planted grow large enough to be of commercial value for timber. In no business is the old adage more true than in forestry, that "an ounce of prevention is worth a pound of cure." Efficient and adequate protection of the forests from fire, and the regulated cutting of timber are, after all, the most effective means of maintaining a perpetual forest growth. Still, a certain amount of artificial reforestation by planting or sowing will always be extremely important.

USE OF TELEPHONE LINES IN FIGHTING FIRES

IN FIRE fighting a minute may mean millions. To realize the truth of this statement, one has only to inspect a trained fire department, used to guard the lives and property, in any city. Most of us are more or less familiar with their time-saving devices; we have admired the splendid horses taught by months of patient labor, to spring to their places at the sound of the gong; have seen them harnessed to the truck in the time it takes to press a button; observed men drop to their places from the floor above. All this training and expense to save a minute's time in the battle against the fire demon, in a city where man has used his utmost ingenuity to build so as to thwart the ravages of this element.

Compared with such a well organized system, the Forest Service methods seem crude indeed. One man with an ax and shovel guards from one to two hundred thousand acres of timber land, worth from one-half to five million dollars. In the greater part of these forests, nature seems to have invited their destruction by strewing the ground with a carpet of dry leaves and resinous needles, and covering the branches and trunks with moss, that, when dry, burns almost as quickly as gun-powder. For one man to attempt, single-handed, to check a conflagration under such circumstances seems worse than foolhardy; and yet, let it be told to the credit of the tribe who wear the Forest Service badge, that when necessity demands, they pit their strength and cunning against the flames, and sometimes, aided by night dews and bull-dog endurance, win out. The Forest Service records could reveal many such cases of which the public has never heard. It is only when the battle has been lost and the fire becomes a public menace that the matter gets into print.

It is obvious that chances are all against conquering a fire of any magnitude under these conditions; consequently, every human endeavor is used to prevent the starting of such conflagrations. During the dry summer months, a ranger's waking hours are spent in patrolling the routes frequented by travelers, to extinguish neglected camp fires, and in searching his district with

RECONNAISANCE PARTY CAMP OUTFIT, KAIBAB NATIONAL FOREST, ARIZONA

EXPERIMENT STATION, COCONINO NATIONAL FOREST

RANGERS CONSTRUCTING TELEPHONE LINES, PLUMAS NATIONAL FOREST, CALIFORNIA

RANGER TRACING LINES IN WINTER UNDER DIFFICULTIES MINNESOTA NATIONAL FOREST

a field glass from some lookout point, to detect the first faint column of smoke that means the beginning of a forest fire.

With so much territory to cover, it is a physical impossibility to have all parts of the district under his supervision at all hours of the day. There will come a time when several fires will start at once. The causes are various; sometimes they are set by lightning from the electrical storms that are common in mountainous country; more often they are due to carelessness of campers or tourists; occasionally they are started wantonly by some person who objects to the arm of the law, as represented by the Forest Ranger, reaching back into the wild places; again, it may be that an unextinguished match, or a spark from a pipe or cigarette is dropped in the dry humus, as the hunter or prospector wanders in places remote from the generally travelled trails. The spark ignites the slow burning duff which smolders, perhaps for days, unseen, the thin smoke being lost in the blue of the spruce tops above it; slowly it burns its way to the resinous roots or mossy trunk of some conifer; the mountain breeze fans it to a flame; it leaps up and seizes upon the dry twigs and the pitch laden foliage; the tree bursts into a pillar of flame and the destruction of the growth of centuries begins. Any of these events may happen any day during the long drouth of summer. When they do occur, the ranger needs help and needs it quickly, to save the heritage he has been set to guard.

If he has a telephone, the call for help will be in at headquarters within an hour, and in another the ranger will be at the fire planning his battle and doing all he can to check the flames. At headquarters the organization that has been perfected for just such emergencies is set to work; by telephone the nearest rangers are sent to his aid; from the lists that have been prepared and kept on file of the available men and horses that can be hired at the nearest settlement, crews and supply trains are organized within a few hours and sent in, if additional help is needed.

With no telephone in his district the ranger must ride to the nearest settlement where he gathers such help and supplies as possible, with the least loss of time and returns to the fire after sending a messenger on to headquarters with the news. But, in the meantime, hours have been lost that may mean thousands to the Nation. I have seen seven million feet of timber burn in one afternoon, because a privately owned telephone line on the national forest was out of repair in just such an emergency as has been described. Several hours were lost in getting a messenger out to the nearest ranger and the news to headquarters; a crew was organized and sent in without loss of time, but arrived four hours after the fire had broken out of control of the ranger and the few men he had gathered. In this short time it swept the whole mountain side clean. The supervisor bought that telephone line before another season opened.

While the principal reason for building these lines is for fire protection, they pay for themselves in other ways by facilitating the business and administration of the forest. Hardly a week passes but the ranger finds it necessary to communicate with his supervisor upon some matter of business. Mail routes are scarce in these remote districts. To get to headquarters he may have to ride one hundred miles, or even more. This means several days of labor lost, to say nothing of the risk of leaving the district without any patrol. With a telephone the matter can be settled in fifteen minutes and the ranger does not leave his work.

During the summer months the forests are used to pasture thousands of head of sheep, cattle, and horses, that are trailed for scores of miles to these summer pastures. The telephone is a boon to the owner in enabling him to keep in touch with his foremen and outfit.

This is why the Forest Service spends thousands of dollars of its appropriation each year in the construction of telephone lines. Besides those built and owned by the Service, they have the free use of many miles of telephone built by settlers in coöperation with the Service. Free right of way and poles are granted to any company, corporation, or private party to cross the forests with such lines; in exchange for these privileges the Forest Service asks the right to connect its lines, or to place an instrument where needed. Settlers and miners are glad to have an instrument placed in their cabins free of charge, the only fee required being that they notify the rangers of any smoke seen in their vicinity. Ofttimes an abandoned telephone line, that has been built into a once prosperous mining camp, is purchased or leased at small expense. Temporary lines are often strung to some lookout point where the instrument is placed in a box and nailed to a tree; such lines are generally strung on trees or brush and taken down when the season is over.

A comprehensive plan for a telephone system has been worked out for each forest; few of these have been completed to date, but something is being added to them each year as appropriations are available. With their completion, and an increased force for patrol during the dry season, a serious forest fire on the national forest will be a rare occurrence.

THE APPALACHIAN FOREST

The following is a statement recently issued by the President of the National Forest Reservation Commission in regard to the work of the Commission, and in regard to the authorization for the purchase of the tract of timberland in Georgia:

June 29, 1911.

THE NATIONAL FOREST RESERVATION COMMISSION has authorized the purchase of a tract of about 31,000 acres of land lying in Fannin, Union, Lumpkin and Gilmore counties in the state of Georgia. The tract is located on the watershed of the Toccoa River, which, after uniting with the Hiwassee River, flows into the Tennessee. The report of the Geological Survey shows that it is a very important tributary, having in mind the purpose of conserving the stream flow. The tract of land which it is proposed to purchase is covered with virgin forest, consisting largely of chestnut, oak, poplar, white pine, maple, locust and black gum. It is a mountainous tract, ranging in elevation from 2,000 to 3,000 feet above sea level, in the heart of the Southern Appalachian Mountains. The Commission is unanimous in considering that it is a tract which is admirably suited to fulfill the purposes for which the law was enacted.

The National Forest Reservation Commission consists of the Secretaries of War, Interior, and Agriculture, Senators Gallinger of New Hampshire, and Smith of Maryland, and Representatives Hawley of Oregon and Lee of Georgia. The board has been proceeding with extreme care in making selection of the tracts of forest to be first purchased, realizing the importance which such purchases will serve in fixing the policy of the Commission for the future . It is therefore selecting only such lands as from their location and character, will directly tend to conserve the navigability of navigable rivers, and which may also serve as the nucleus of any pressure to enter into haphazard or improvident selections, but will proceed with extreme care to lay the foundation of what is intended to create a series of forest reserves in such locations and of such character as will carry out the clear intention of Congress.

The Act under which the board is proceeding was not passed until March 1, 1911, and the board has been acting with the utmost diligence upon all of the tracts which have been presented to them, according to the statute, by the Bureau of Forestry and the Geological Survey. Three members of the board have visited personally the tract in question. Both the Bureau of Forestry and the Geological Survey strongly recommended the present tract as fulfilling all of the characteristics required by the statute; and the scintific demonstration made by the Geological Survey of the importance of the stream flow out of the tract in question upon the navigability of the Tennessee River was very clear and cogent.

Many other tracts, both in the southern and northern Appalachians, including certain tracts in the White Mountains, are now under investigation by the Forestry Bureau and the Geological Survey, and as soon as reports are made by those bodies the Forest Commission will proceed to their consideration.

In view of the magnitude of the enterprise which is being thus begun, the board does not propose to pay any speculative or high prices for lands and will not purchase any land which will not conduce directly to the purposes of the Act. This is necessary not merely on grounds of sound policy and economy, but is also made necessary on constitutional grounds, as the Act under which the Commission was created is based upon the power of the Federal Government to regulate commerce and protect the navigability of streams.

FORESTRY IN THE AMERICAN TROPICS

By JOHN GIFFORD.

IT SEEMS to me that forestry shorn of mathematics and theory is the growing of trees primarily for fine lumber. Except in a few places devoid of wood of any kind, it is a mistake to plant trees for fuel wood alone. Not only sawlogs, but sawlogs of such quality that they will bring the very highest price on the market should be the aim of foresters. Fuel wood we have in excess and soft coal is so abundant and so cheap that stock in a soft coal company at the present time is a very poor investment. In the major portion of this country under normal conditions the limbage and waste ought supply all fuel demands.

It certainly does not pay to hire expensive men to look after cheap stuff on cheap land. A dollar is simply a token for a certain amount of human effort, and although in Europe materials are carefully conserved, there is a woeful waste of human labor. We waste materials, but we certainly save effort by the use of labor-saving machinery and up-to-date tools.

There are economic laws that govern development, and I think it is safe to say that agriculture and forestry must develop hand in hand. In other words, there must be a rural population. The cheapness and abundance of land is due, of course, to a sparseness of population in the country. Our census gives us little hope. Were it not for the incoming tide from elsewhere our rural population would decidedly decrease and land would decrease in value accordingly. The newcomers who settle in the country hardly offset the drift to the cities.

I have been interested of late in the handling of lands and in keeping tab on the prices of land throughout the South, including the West Indies. I have been impressed with one thing—the ridiculous price that much of it sells for regardless of what covers it. I will give but one instance of many letters which I have received in reply to advertisements in local papers: 160 acres, 70 acres in cultivation, 40 acres pasture, balance in fine oak timber; one six-room house, one three-room house, two hen houses, a granery, smoke house, seed house, cow shed, a shop, two good barns, 300 bearing fruit trees and vineyard, near to church and school, rural mail delivery and telephone; fine water and a very healthy locality. Price, $1,000; on easy terms.

You will naturally say, just as I have said many times, that there must be something wrong. A careful investigation will show that in nine cases out of ten the old neighbors have gone to the towns, the newcomers are not liked, or rather not understood, and the children are dissatisfied.

We may hope for change in time, but time is the important element. Unfortunately, good growth is usually slow growth. This discourages private enterprise and is the main reason for governmental control of a certain part of our forested area. After ten years of experience in the American tropics I have unlearned much that was laboriously taught me in school and have come to the lamentable conclusion that our knowledge of tropical American trees from a silvicultural standpoint is so meager that it hardly counts.

Foresters have collected data relating to fifty or more forest trees of the North for many years, but of the three hundred or more forest trees of the tropics practically nothing is known except their names and the names only imperfectly known.

For the bulk of our timber supply we must depend on private commercial enterprise, but as yet, in the major portion of our country, the return, considering the risks, is not sufficient to tempt capital. A paltry return of five per cent or ten per cent does not satisfy the common run of investors; in fact, a return of twenty-five per cent or more is what is expected and what many tropical ventures yield.

I have always worked on the theory that for forestry one should select regions where there are the largest number of growing days, other things being equal. We should also select those species which grow with the greatest rapidity, provided they yield good wood. I know of no forestry proposition, for instance, that would yield a larger return than growing eucalyptus in Pinar del Rio for tobacco poles. The growing of fuel wood, or even tobacco poles, however, does not appeal to me from a forestry standpoint. I would prefer to grow a wood which yields lumber fit for constructive purposes.

As to location many of our best regions, such as rich inland valleys in the tropics, are inaccessible. In South Florida and the West Indies, however, there are vast areas within comparatively easy access of the markets of the world.

In the matter of forestry, the political lines separating one country from another, cut a small figure.

Every forester, in fact every person interested in forestry, should plant a few acres of trees and care for them properly. It is easy to talk about and easy to write about, and I am sorry to say that too few foresters actually own forest land. There is nothing like bringing a proposition home for close and careful inspection.

Of the quick growing trees of the world yielding timber of the highest class, is the great order *Meliaceae*. It is to this order that mahogany belongs and, although much of it is not mahogany from a botanical standpoint, it sells as well, and sometimes better, than the wood of *Swietenia*, the true mahogany. The trees to which I refer either belong to the genus *Cedrela* or are closely allied to it. There is *Cedrela fissiles* of Brazil and Paraguay called *Acajou; C. Toona*, the toon or red cedar of the East Indies and Australia and *Cedrela odorata*, the Cigar Box Cedar of the West Indies. The latter seems to exist in three distinct varieties, at least commercially, *cedro blanco, cedro hembra colorado* and *cedro macho*. *Cedro macho* or even *cedro hembra colorado* sell under the name of mahogany. These trees grow quickly, on soils of almost any nature, and so far I have succeeded in reproducing them from cuttings. I have a *Cedrela* in my yard which has grown from a cutting at the rate of more than two feet per month. The cutting was put in the ground in March and the accompanying photo of this tree was taken during the latter part of September. It is therefore only six months old from the time the cutting was stuck in the ground. The cutting was not much larger than a lead pencil. Of course, the cool weather will check its growth and something may happen to it, but if it continues to grow at this rate it will soon afford ample shade and many cuttings for further plantings. Fashion may change, since it was not long ago that they were trying to grow crooked oak for the British navy; but these woods of the mahogany group have stood the test of time and have always brought a high price irrespective of the price of other woods.

I have never tried to figure on the return from a plantation of *Cedrela.* In forestry, as in other things, I find it never pays to count your chickens before they are hatched, and I fear that is too often the case with foresters and the promoters of enterprises in general. I think it is safe to say, however, that a *Cedrela* plantation, close to good transportation, ought to yield as much, if not more, than any tree I know of.

Marden says that *Cedrela australis,* which is practically the same as *Cedrela toona,* "is, without doubt, the most valuable timber produced in New South Wales." It is used for carriage building mainly, but has many other uses, of course. It is by far the most popular tree with the foresters of the part of Australia where it grows.

There are other genera of the great order *Meliaceae* in Australia with which I am experimenting. One in particular, the Australian Rosewood (*Dysoxylon Fraseranum*) is o the mahogany class and, although as yet but slightly used, it will come to us some day as a high-priced cabinet wood. It is still cheap in Australia, but according to one forest officer, "the virtues of rosewood cannot be overrated." Another forest officer says, "there is a tremendous future for this wood and it is worthy of careful nursing and protection, more especially as red cedar (meaning *Cedrela australis*) is now nearly extinct."

It may be a mistake to pin oneself to one species or one order of woods, but where their number is legion there is little else to do.

Closely related to these *Cedrelas* is the genus *Quarea. Guarea trichiliodes,* the guaraguao of Porto Rico, is a valuable tree with wood very similar to *Cedrela,* but devoid of the cedary aroma. This cedary aroma is supposed to keep insects out of cigars. There are several species of the genus *Trichilia* and a dozen or more little known species of *Cedrela.*

In South America, especially the region bordering on the Carribean Sea, there are still other genera.

This group of probably fifty or more species is all that could be desired from a silvicultural st ndpoint. They are quick growers, great seed producers (not small seeds like the eucalypts and melaleucas which blow away or which the ants devour) and free from disease. The wood they yield is fit for the very finest cabinet work, carriages, furniture, boards and shingles. Even the small limbs may be cut into shingles. The value of lumber anyway up to date is mainly the labor which has actually been put into it. The stumpage value, including the land, is ridiculously low—low because land is plentiful and people few.

I might add in conclusion that all planters in the tropics must take into account that a hurricane comes now and then which blows the weaklings flat to the ground and strips some of the stronger trees bare of leaves. While I write (October 17) the barometer is low and the tall straight Australian pines, which were made to withstand the gales, are bending and swaying like whips.

A CEDRELA SIX MONTHS OLD FROM A CUTTING
SOUTH FLORIDA

A RANGER STATION ON THE LOLC NATIONAL FOREST

A GROUP OF RANGERS AND INSTRUCTORS. UNIVERSITY OF MONTANA. SHORT COURSE FORESTRY CLASS, 1911

FOREST SCHOOLS OF THE UNITED STATES

I.

THE UNIVERSITY OF MONTANA

By J. E. Kirkwood, Ph. D.
Assistant Professor of Botany and Forestry

THE University of Montana is at Missoula in the western part of the state. Missoula is on the main line of the Northern Pacific Railroad, and the newly constructed transcontinental line of the Chicago, Milwaukee and Puget Sound Railroad also passes through the city. Missoula lies at the mouth of the famous Bitter Root Valley and near the main range of the Bitter Root Mountains, which form for the most part the western boundary of the state. Northward as the crow flies is Flathead Lake, 55 miles away, and eastward it is 72 miles to the summit of the continental divide near the head of the Blackfoot River.

The altitude of Missoula is about 3,200 feet. Its climate is pleasant, not subject to extremes of heat or cold, and its annual rainfall amounts to about 18 inches. The location is healthful, and the natural environment attractive in its plains, mountains and forests, its lakes and streams.

Natural environment is of undoubted importance in the location of a forestry school, and in this respect the University of Montana is well situated. On all sides the hills are clothed with timber, some near and others more remote, but good stands of timber are in the immediate vicinity of the university. A great diversity of condition prevails, which affords opportunity for the study of forest ecology in its various phases. Extensive tracts of young growth show different conditions of reproduction. The timber of the immediate region is mainly western yellow pine and lodgepole pine, western larch and Douglas spruce. In the region tributary to Missoula, within a radius of 75 miles of the city, occur sixteen species of conifers. Besides those mentioned above are the western white pine (P. monticola) and the two subalpine species the white-bark and limber pines. There are also Engelmann spruce and Lyall's larch, the western and black hemlocks, the lowland and alpine firs, the arbor vitae, and the Rocky Mountain and common junipers. The western yew also occurs in shrubby form. The hardwoods, so called, are not of much importance, the largest and most abundant of these being the black cottonwood and the aspen, sharing the stream bottoms with a smaller growth of choke cherry, hawthornes, birches, alders and willows.

The timber of western Montana is largely reserved in the national forests. The boundaries of the Missoula, the Lolo, and the Bitter Root National Forests are within a few miles of Missoula, and these and several others including the Deer Lodge, the Flathead and the Lewis and Clark are easily reached by rail or stage.

The proximity of the national forests is a distinct advantage. Likewise the fact that the main administrative offices of District No. 1 are in the city of Missoula. These circumstances bring the work of the United States Forest

Service to the convenient observation of the student. The administration of the national forests is a matter of importance to every student of forestry in this country, and especially inasmuch as the greater number of students ultimately find their employment in the Forest Service. On the national Forests may be seen extensive timber-sales managed on silvicultural principles, nursery work and field planting, improvements, the operations of forces engaged in forest protection, in the elimination of agricultural lands, etc. In addition to these are the enormous logging and milling plants of private interests.

The environment of the University of Montana offers rare facilities to the student whose work is to be with the Forest Service. Western life and conditions are essentially different from those of other parts of the country. The West is vast and much of it sparsely settled. The state of Montana itself extends 650 miles from east to west, and 275 or more from north to south. There are large tracts of wilderness into which not even a trail penetrates. Far removed from the settlements the forester must often find his work, and the man inexperienced in woodcraft is not likely to prove efficient in the discharge of his duties under such circumstances. There is frequently a vast difference between the theoretically desirable and the practical, between ideally correct silvicultural treatment and the character of treatment necessitated by local conditions, and which will be necessitated for many years to come in western forestry. Moreover one needs to understand the people, the settlers, whose interests are bound up more or less intimately with the administration of the forest reserves. Taking all these things into consideration, the matter of experience under western conditions is by no means a negligible quantity. It is rather a necessary asset in the equipment of the western forester.

It is now two years since instruction in forestry was begun in the University of Montana. Two general courses are now offered. A four years' undergraduate course is given in the fundamentals of an education in forestry. At the outset facilities are such that it is deemed impracticable to give a full technical course. The work as planned designs to prepare the student to such an extent that he may be able to finish at one of the larger eastern schools with a year of study of some of the more strictly technical branches. The scope of the work will be broadened, doubtless, in the near future. As at present outlined the four years' course gives a thorough grounding in the subects of mathematics and engineering, physics, geology, mineralogy, chemistry, botany, and zoology. It includes the study of modern languages, history and political economy. Instruction is also given in dendrology, silviculture, wood technology, and forest pathology.

An important feature of instruction in forestry at the University of Montana is the winter school for rangers in the Forest Service. In 1910 the course was first organized, instruction beginning in January with an enrollment of 50 men. These men were detailed to take the course and came from various parts of District 1 from Michigan to Washington. Owing to the ruling from Washington, D. C., relative to the status of rangers while in attendance at institutions of learning, many of the men were obliged to discontinue and return to their homes. A reasonable number, however, finished the course at their own expense. In 1911 the three months' course was again offered, with the result that 30 students registered (about double the number completing the course the first year), and most of these at a sacrifice of salary in addition to considerable incidental expense.

Thus the results justified the establishment of the ranger school and its usefulness is made evident. As at first organized the course included the

subjects of dendrology, silviculture, geology, mineralogy, surveying, mathematics, mensuration, timber-sales, lumbering, planting, and grazing as required work, with elective courses in chemistry, physics and botany.

In recognition of the need of more extended instruction in several of the branches, and of the introduction of others, the ranger course has been expanded to cover six months (two winters). This plan will be put into effect next winter. There will still be the same opportunity for those who can give but one season to the work, but those who wish to return for a second winter will find additional courses to meet their demands. The subject of lumbering will be divided into descriptive lumbering, forest products other than lumber, and lumbering engineering; additional work will be given in surveying, mapping and drafting; botany will be taught from the systematic and ecological standpoint, preparing men especially for work in connection with grazing and grazing reconnaissance. Courses will be given in forest pathology, in forest management, and in public land laws.

In addition to the four years' course and the ranger school, the university seeks to extend its usefulness to men who are unable to register as resident students. To a limited extent correspondence courses are offered in dendrology, silviculture, mineralogy, surveying and mathematics. This work is designed chiefly for rangers in the Forest Service, who have not time or means to attend the university.

A summer forestry cruise from the university has been announced. This is designed as a tour of the Pacific Coast primarily for the study of the relation between silviculture and practical lumbering. To this work about six weeks' time is given, devoted largely to observation of large logging and milling operations in the regions traversed.

A FOREST SERVICE TIMBER DEAL

ONE of the largest deals in timber in the history of the United States Forest Service is at present well under way, and the outlook for an early consummation of the sale of approximately 600,000,000 feet, board measure, of standing timber is extremely bright.

Application for this timber was made by the Navajo Development Co., a corporation chartered under the laws of Arizona; a careful examination of the area has just been completed by representatives of the company and of the Forest Service.

The tract is located in the eastern part of Arizona, comprising a large portion of the Sitgreaves and Apache National Forests, and is estimated to contain for cutting approximately 575,000,000 feet of western yellow pine, 15,000,000 feet of Douglas fir, 6,500,000 feet of white fir, 1,500,000 feet of Engelmann spruce, 1,000,000 feet of Mexican white pine, and 1,000,000 feet of blue spruce and corkbark fir, board measure, of saw and tie timber, log scale.

The western yellow pine is frequently known as "western white pine," and possesses many of the qualities contained by the white pine of the north woods, the lumber manufactured from it is light and soft, but has considerable strength; the upper grades are much in demand for manufacture into finishing stock, flooring and ceiling, sashes and doors, etc. The clear stock is highly prized by pattern makers, and the entire output of this class of material of one manufacturer is sold to one of the principal transcontinental railway lines for use in making patterns in its shops.

Douglas fir is excellent for mine and other timber, and certain railroads pay more for cross ties manufactured from this class of material than for those made from other species, owing to the fact that they last much longer in the ground. Many thousands of cross ties are made annually in the Southwest, from white fir and the other species mentioned.

The timber is located about 60 miles south of Holbrook, Arizona, the county seat of Navajo County, situated on the main line of the Atchison, Topeka and Santa Fe R. R. from Chicago to the Coast. From this point a railroad will probably be constructed south to the timber, passing in the vicinity of several small towns and through a section containing much agricultural land, a good portion of which can be irrigated by means of driven wells.

All of the cost of railroad construction will not have to be borne by the lumber operations, since by making the road a common carrier, yearly many thousands of tons of freight, now handled by slow, cumbersome freight wagons, would be hauled on the new line. Large quantities of hay, grain and other supplies, all of which must be shipped into the region, are consumed yearly in the small towns and at Fort Apache, an important military post, located about 20 miles south of the tract. In addition, considerable revenue will be obtained from passenger traffic, since, besides civilian travel, several movements of cavalry troopers and their horses to and from Fort Apache are made annually.

Large deposits of coal, said to be of excellent coking quality, exist within 30 miles of the timber. The development of these deposits only awaits a railroad to the vicinity.

It has been the policy of the Forest Service in the past to limit the time allowed for completing the cut contracted for in sales to five years. But in order to protect the investment required in undertaking such a large scale as the one proposed, this period is evidently too short. Therefore, ten years will be allowed in which to complete the contract, beginning at the time of completion of the railroad and sawmill, for which two years additional time will be allowed.

The minimum price which will be considered is $2.50 per M. ft. B. M. for the first five years of the contract and $3.00 per M. ft. B. M. for the last five years.

The tract contains what is probably the finest large body of timber remaining in the Southwest, and is located on a large plateau, well watered, with almost ideal logging conditions. The ground is smooth, level or gently undulating, enabling logging to be done at mimimum cost, while owing to the favorable topography spur tracks can be constructed very cheaply.

The stand of timber is heavy, and the quality is excellent, assuring a large percentage of upper grade lumber.

The major conditions of the contract as proposed are: All timber to be cut will be marked for cutting, by the forest officer in charge. All timber will be scaled by Scribner Rule, Decimal C. The purchaser will co-operate in fire protection by assisting in fighting fire and by disposing of the debris of logging as directed by the officer in charge. Dead and marked green trees which are a fire menace will be felled. Free special use permits will be granted for the construction of necessary railroads, telephone lines, sawmills, camps, commissaries, etc. The Government reserves the right to turpentine any of the timber included in this sale, the turpentining not to interfere in any way with the logging operations.

These regulations are those which have been in effect in timber sales made by the Forest Service during the last five years.

A deposit of $10,000 is required with all bids and the successful bidder must give a bond of $50,000.

A sample contract showing the provisions in detail together with further information and regulations governing sale, can be obtained upon application to the District Forester, Albuquerque, New Mexico, within whose jurisdiction the sale lies.

Taken altogether this is one of the most attractive propositions to be found in the Southwest, not only from the point of view of the lumberman, but also from that of persons interested in opening up and developing new regions. Yet this can hardly be called a new region, since settlement has been going on for many years, and will undoubtedly be stimulated by the building of a railroad to reach the timber under consideration. At the present time tens of thousands of cattle, sheep and horses graze in the region, yet all beef, mutton, wood and other products must be driven on the hoof to Holbrook, for shipment, or else freighted by wagon, over distances varying from 30 to 100 miles.

Besides the timber involved in this case, other large bodies aggregating one and one-half billion feet, board measure, will be made accessible by means of the proposed railroad.

EDITORIAL

THE POLLUTION OF RIVERS AND HARBORS

OF THE evil and uncivilized things done by our modern civilization there are few that have so little excuse as the pollution of streams and coast waters with sewage. Hardly a river that has large cities near its banks runs pure and uncontaminated. Many of them are a stench in the nostrils and an offence to men when they should carry health, pleasure and beauty in their course.

Undoubtedly the rapid growth of urban population makes the disposal of sewage a problem of some difficulty, but if modern chemistry and physics are unable to solve it, sanitary science is a failure.

Filth and slime where cleanliness and purity should be; sources of disease in an element that should be a powerful aid to health; an offence to the senses when they should find joy and satisfaction—that is the condition today of many of the rivers in thickly settled portions of the country and of some of our harbors.

New York harbor is offensive at certain times of year because of careless disposal of the enormous quantities of garbage and also of the emptying of sewers into its waters. Gorged with the waste of the city, the harbor has at last refused to take care of the accumulation and conditions threaten the welfare of the metropolis.

The Merrimac River, receiving year after year the mill waste and communal sewage from the cities along its banks, has become polluted beyond the point of safety, not to mention comfort. Yet here is a stream that is fed by waters of exceptional purity, following a course that would maintain that purity if human intelligence would give attention to its protection.

We stand very much in need of careful study of our streams and their relation to the life along their banks, a study that shall be scientific, comprehensive and practical. When our river systems are thus studied we shall come to know these water courses as a great gift of nature to be guarded and improved, not insulted and defiled. In this protection and improvement, the part played by the forest will be recognized and forests, properly located upon the watersheds, will be recognized as a part of the system, just as they now are on the watersheds of the well-regulated municipal water supplies.

GETTING AT WORK

NATURALLY, in view of the great and widespread public interest in the Appalachian forests and the long struggle to secure national legislation looking toward their preservation, the working of that legislation now that it is on the statute books is watched with intense interest by many people in many states. The Forest Service, as soon as it became evident that the Weeks bill would probably become a law made ready an efficient field and office force to do its part in carrying out the law and work was begun immediately

after the enactment. Unquestionably this was primarily a Forest Service problem.

But there were two other agencies involved besides the Forest Service, which was the active representative of the Secretary of Agriculture. These were the National Forest Reservation Commission, created by the act to be the final authority in land purchases, and the Geological Survey, which because of its staff of scientific experts and its fund of topographical, geological, and hydrographical data was relied upon to be especially qualified to report upon the relation of forests to the flow of the navigable streams, whose watersheds might be recommended for purchase by the Secretary of Agriculture.

The Commission took up its work with commendable interest, even the one commissioner, Representative Hawley, who had been an opponent of the bill in the House, putting aside his prejudices and giving himself with interest and intelligence to the task assigned him. We are glad to be able to say this because we criticised, and not unreasonably, Speaker Cannon's appointment of Mr. Hawley on the Commission.

It became known, however, within a very few days that the Geological Survey was doing nothing. Interviews with the Director by various persons developed the fact that he took very seriously the responsibility of his bureau under the law and proposed to act with great deliberation and thoroughness. His first statement to the public when criticism of his known or supposed attitude became vigorous and insistent, was published in AMERICAN FORESTRY in June. However impatient of delay the friends of the law might be, the expressed intention of the Director to use proper care and scientific thoroughness in carrying out the part assigned to the Survey would certainly not be fairly open to criticism.

It was felt, however, and justly, that inaction was not justifiable. If the Survey felt so strongly its responsibility under the law, it should have been ready to act promptly upon its passage for the life of the law is limited and time is an essential factor in the contract with the people.

It must be said frankly that the Survey has been slow in getting into action. Much was said at first of the need of topographical maps of the regions involved. As these have all been mapped by the Survey, new mapping is certainly not needed for the purposes of this law. In the water supply records of the hydrographic division the Survey has more data in regard to stream flow than it can assemble during the life of this act, and it is conceded that such observations require a long term of years to be of real scientific value. To experts accustomed to judging geological conditions, the soil examination in districts so well known and so amply reported upon as the White Mountains and Southern Appalachians should be a comparatively simple matter. Nor does it seem that the practical purposes of this law call for nice technicalities or elaborate and involved research. The question is one of trained judgment applied to visible conditions.

With the question of navigability of streams we cannot see that the Survey has anything to do. That is largely a matter of legal interpretation and rests entirely with the Secretary of Agriculture and the National Forest Reservation Commission.

On the 22nd of June in reply to numerous newspaper criticisms, Secretary Fisher of the Interior Department issued a brief statement endorsing the course of the Director of the Survey, the substance of this being that the action of the Survey could not be perfunctory. June 23rd the Director of the Survey gave out a second statement to the Boston newspapers, explaining his position at length. This statement was an eminently temperate one, in view of the criticism to which its author had been subjected, but it was chiefly

interesting because of its assurances which promise progress, if lived up to. The Director said that not much, if any, topographic work will be needed in the White Mountains. It will be gratifying to all New Englanders to read the following "My purpose in the White Mountains is to make the most careful investigation there in order to get what I am very anxious to secure; that is the data on which I may base what I wish to present, a favorable report for the consideration of the Commission."

The Director further declared that geologists would go into the mountains early in July and this has been done. The Director has been invited to attend the forestry meeting at Bretton Woods, where many of the leading friends of the Appalachian movement will foregather. It is to be hoped that he will be there. It will bring about a better understanding and we hope that from this conference complete harmony will result, and that cordial co-operation of the official agencies for carrying out the new law may be looked for during the remainder of its term.

If Congress during this, or the next session, restores to the appropriation the three million dollars lost through technicalities, and this should be easily accomplished in view of the conservative manner in which the law is being administered, and if the Geological Survey interests itself heartily in securing results, another year may see the friends of this great public measure much more cheerful than they have been for some time, or are now.

There is a natural tendency on the part of men whose life is devoted largely to scientific research to see that side of a project of this kind, but we are compelled to look at it as a great practical measure under which results must be accomplished at the earliest possible time in order that they may be as productive as possible of benefit.

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NATIONAL FOREST WORK

President Taft Makes Changes in National Forests

A number of changes in the national forests of California, Oregon, Idaho, and Wyoming, made in the interest of more convenient and economical administration and especially of better protection against fire, have just been announced. These changes have been accomplished by President Taft through a series of proclamations signed at different times in June, but all becoming effective July 1. The proclamations were drawn so as to dovetail into one another, with the result that taken all together they substitute twenty-six national forests for a former seventeen.

The only increase in area is in California, in which two small additions, involving a total of a little over 17,000 acres, are made. On the other hand the proclamations eliminate a total of nearly 242,000 acres, as follows: 85,000 acres in California, nearly 126,000 acres in Oregon, about 6,000 acres in Idaho, and about 25,000 acres in Wyoming. Thus the rearrangement which puts twenty-six national forests in place of seventeen is accomplished by a neat reduction in area of 225,000 acres. It is explained by officials of the U. S. Department of Agriculture that last summer's fire experience in the Northwest made it clear that many of the forest supervisors were in charge of units which were too large for efficient administration. The changes are a part of a general movement to develop, with the aid of last year's experience, the most efficient system of fire protection possible at the present time.

In Idaho the Clearwater, Coeur d'Alene, and Nezperce National Forests were reduced by the establishment of two new units, to be known as the Selway and St. Joe National Forests, with headquarters at Kooskia and St. Marie, Idaho. This was brought about as follows: From the Coeur d'Alene to the St. Joe there was transferred 810,200 acres; from the Clearwater to the St. Joe, 223,300 acres; to the Selway, 1,684,860 acres; to the Nezperce, 16,640 acres, and from the Nezperce to the Selway, 117,140 acres. There was eliminated from the Nezperce several small tracts aggregating 5,920 acres, which upon examination were found to be non-forest land.

In Wyoming the Bonneville was divided into three national forests. The former Sweetwater Division, the southern portion of the Bonneville, embracing 393,950 acres, becomes the Washakie Forest, with headquarters at Lander; the Green River Division, the central portion of the forest, embracing 577,850 acres, becomes the Bridger, with headquarters at Pinedale; and the northern portion of the forest, embracing 631,270 retains the name of Bonneville, with headquarters at Dubois. Eliminations aggregating 24,936 acres were made from the Bonneville; 2,564 acres from the southern division; 14,175 acres from the central division, and 8,197 acres from the northern division. These areas consist of small tracts lying along the borders of the forest which upon examination were found to be non-forest lands.

In California changes were made affecting the Klamath National Forest, as follows: A total addition to the Klamath of 3,480 acres of forest land; an elimination of 85,000 acres in various small tracts consisting principally of alienated lands lying along the eastern border of the forest; two small transfers from the Siskiyou and the Crater forests to the Klamath; and a transfer of 352,000 acres of land from the Klamath to the Siskiyou, embracing all of the Smith River drainage lying within the forest. In connection with the latter transfer, 13,755 acres of valuable timber land located within the state of California were added to the Siskiyou National Forest.

In Oregon changes were made in the Cascade, Chelan, Crater, Deschutes, Fremont, Malheur, Oregon, Siskiyou, Umpqua, Wallowa, Whitman, and Umatilla forests and the new Minam. Ochoco, Okanogan, Paulina and Santiam forests were established from transfers from the other forests mentioned. Transfers occurred as follows: From the Umpqua to the Cascade, 168,508 acres; from the Cascade to the Santiam, 216,821 acres, to the Deschutes, 504,864 acres, and to the Paulina, 147,720 acres; from the Chelan to the Okanogan, 1,732,820 acres; from the Crater, 9,200 acres to the Klamath, and 61,370 acres to the Paulina; to the Deschutes 174,130 acres from the Oregon, 504,864 acres from the Cascade, and from the Deschutes 699,720 acres to the Ochoco and 407,120 acres to the Paulina; from the Fremont to the Paulina, 411,000 acres; to the Malheur from the Umatilla 179,550 acres, from the Malheur to the Ochoco 119,310 acres; from the Oregon to the Santiam 493,349 acres, to the Deschutes 174,130 acres, from the Siskiyou to the Crater 12,400

acres, to the Siskiyou from the Klamath 352,000 acres in connection with which were added 13,755 acres to the Siskiyou; from the Umpqua to the Cascade 168,503 acres, to the Paulina 306,149 acres; from the Wallowa to the Minam 448,330 acres; from the Whitman to the Umatilla 276,170 acres; and from the Umatilla to the Malheur 179,550 acres, to the Umatilla from the Whitman 276,170 acres. Eliminations from the forests in Oregon occurred as follows: 320 acres of patented land from the Chelan, 27,931 acres from the Crater, 32,935 acres from the Deschutes, 10,606 acres from the Oregon, 9,610 acres from the Siskiyou, and 44,414 acres from the Umpqua. The lands embraced within these eliminations consist of many small bodies lying along the borders of the various forests which upon examination were found to be non-forest lands or patented lands that could well be excluded from the forests.

Seed Collecting on the Kaibab

Since the coniferous trees growing on the national forests do not as a rule reproduce themselves from sprouts, all nursery work, planting and sowing in this district, must begin with the seed. Until there is seed nothing can be done in the way of reforestation. A large quantity of seed economically collected is therefore the foundation of all subsequent work.

CONDITIONS FOR COLLECTIONS.

Ideal collecting aims at obtaining the largest quantity of seed in the shortest possible time and at the least cost per pound, using the funds available for the purpose. It is evident, therefore, that the best collecting can be accomplished only when there is a full seed crop. It is possible to find a few cones every year. At intervals of two or three years, a species will produce an unusually heavy crop. "Seed years" and "off years" and general and alternate in case of Yellow Pine and Douglas Fir, thus 1907 and 1909 were good years for Douglas Fir while 1906 and 1908 were good years for Yellow Pine. The seed crop from the forester's standpoint is not abundant unless the supply of cones is sufficient to make seed collecting profitable. Forest officers occasionally report good seed crops when this is not the case. Frequently poor crops are reported when collecting could be well done with profit. A careful examination of extensive bodies of timber is necessary to determine the abundance of the seed crop and also to determine the best localities for collecting. During "off years" cones are much more liable to be affected by insects than during good seed years. It is, however, always necessary to examine them before arrangements for collecting have been completed. This can readily be done by peeling off the scales with a sharp knife, cutting toward the apex of the cone. The fertility of the seed can also be determined in this way. If an abundance of cones of good quality are found in a given locality, collecting becomes a question mainly of *time, method* and *organization.* Seed collecting consists in gathering the cones as soon as the seed is ripe, in drying them out so as to release the seed, and in cleaning and storing the seed for use.

TIME FOR COLLECTIONS.

Before proceeding with the details of collecting, it is necessary to find out when the seed is ripe. This is more difficult than one would think. Cones of the same species ripen first at the lower altitudes. The external appearance of the cones seems to indicate very little. It is necessary to open them as above stated and to examine the seed itself. As long as the seed is soft and milky, it is still immature. It is considered safe to commence collecting as soon as the squirrels begin to store the cones for food, about September 1. Heavy frosts, followed by warm days, materially hasten the ripening of the cones and consequently lessens the time during which collecting from the trees can take place. It is readily seen, if seed is ripe on September 1, and the cones open by September 15, that the period of collecting is necessarily short. For this reason it is imperative *that the equipment be obtained early in fall, that the work be organized on a scale sufficiently large and that it be expedited in every way possible so that it will be completed before the cones open, and before disagreeable weather makes drying difficult or impossible.*

METHODS OF COLLECTING.

There are three methods of collecting cones (a) from felled trees, (b) from standing trees, (c) from squirrels' caches. In places where timber scales are in operation and a species, the seed of which is desired, is being logged at the right time, and a sufficient number of trees are out, it may be preferable to follow the cutters and to pick out the cones from the felled trees or from the ground after the brush has been piled. Where no cutting is done and no easier method of collecting can be found, it will be necessary for the collectors to climb trees. In that case the more limby trees are generally selected and the cones are picked and stripped off by hand. The limbs may also be lopped off, and the branches snapped off by means of hooks fastened to poles. In several instances, special trees have been cut down for the sale of their cones supply. This, however, is not desirable unless the trees bear an unusually large quantity and unless they can be spared and profitably disposed of. Picking from standing trees at best is difficult and expensive. Cones can easily be obtained economically by robbing the

caches of the pine squirrels, since they usually store large quantities. As would be expected the better caches generally occur in the denser stands of timber. They are found along small streams and springy places, in water and muck. Dry caches are frequently found under bushes, trees, tops, and rotten logs. Caches are sometimes covered with humus and are so carefully concealed that it is difficult for the inexperienced to locate them. The squirrels' trails to and from the caches frequently help in locating their stores.

When extensive collecting is undertaken, it is often possible to use several or all of the above methods of obtaining cones. Collecting from squirrels' caches, however, has proven most satisfactory. It has this important advantage, that it can be carried on after the cones on the trees are open and collecting from standing trees becomes impossible.

In the fall of 1907, 610 bushels of Lodgepole Pine cones were collected from squirrels' caches on the Targhee National Forest at an average cost of 18 cents a bushel, one man picking 13½ bushels a day. During the fall of 1908, 1,137 bushels of Yellow Pine cones were collected in the Boise National Forest by the same method after the cones on the trees had opened. In these cases collecting by any other method would have been considerably more expensive.

DRYING THE CONES.

During collecting the cones are usually picked into buckets or baskets, sacked and transported to a place convenient for drying. They are then spread thinly upon canvas sheets or wagon covers and allowed to dry in the sun. If the drying is liable to be continued until the soil becomes cold and wet, it is advisable to prepare a raised platform upon which to spread the canvas. The cones should be spread out thinly upon the sheets. After being exposed to the heat of the sun for a few days, they generally open and allow the seed to drop upon the sheets. The rate of drying depends upon the weather and upon the species. Yellow Pine, Douglas Fir and Englemann Spruce open readily while Lodgepole Pine opens with the greatest difficulty. It is therefore generally necessary to dry the latter species by artificial heat inside a building, or, even better, to collect the cones in quantity in fall and to store them till the following summer when they can readily be dried in the sun.

If the other species mentioned are collected early and good drying weather prevails, it is hardly necessary or advisable to dry them by artificial heat, unless the work is unduly delayed or the weather unusually favorable. It then becomes necessary with all species to resort to the slower and more expensive artificial drying. If artificial drying becomes necessary, a suitable building should be selected or constructed and provided with tiers of trays arranged around the inside of the room, 8″ to 10″ apart. The trays should be constructed with screen bottoms having a ¼″ mesh through which the seed can drop upon a canvas sheet on the floor of the building. After the trays are filled with cones, one or more stoves are heated up so as to keep the temperature of the room 120° to 140° until the cones have opened up. Partial ventilation of the room to carry off the moisture-laden air is necessary to obtain the best results. When the cones have opened they are removed from the trays and thrashed out, and another supply of cones is then put into the trays.

Twelve square feet of drying space is usually allowed to a bushel of cones. Some of the cones usually open more readily than others. An occasional stirring by means of an iron rake will result in a more even drying. Sorting opened from closed cones is not advisable unless cones are placed too thickly upon the sheets.

EXTRACTING THE SEED.

In case of Yellow Pine a thorough raking of the open cones is generally sufficient to dislodge all the seed. *In Douglas Fir and several other species all of the seed cannot be removed without more violent jarring.* Severe jarring is usually accomplished through a "cone shaker." Such a device may be constructed from a large, strong dry goods box, about 4 by 3 by 3 feet. It is provided at one end with a door made of slats so spaced as to permit only the closed cones to fall through. This door should be fitted, also, with a removable wire screen of such sized mesh as to permit only the seed to escape. Any suitable size of cylinder or box may be used for this purpose. It should be built on a pole as an axis and swung between two trees, or mounted on a windlass frame. A crank should be attached to one end of the axis in order to revolve the apparatus and jar the seed loose. Slats may be nailed lengthwise inside the apparatus, or loose blocks of wood included with the cones, to increase the jarring effect. After the seed has escaped, the screen should be removed and the churning continued to separate the closed cones from the larger sized open ones. The closed cones can then be returned for further drying. While jarring with most species is necessary, trampling the cones is considered too severe and liable to injure the seed.

EXTRACTING THE SEED.

When the seed is separated from the cones it usually contains light membranous wings, broken cones, scales, twigs and other foreign matter which may in part be removed by a large meshed screen. The wings can be broken from the seed by rubbing between the hands or placing it in loosely tied sacks which are then kneeded

or rolled on the floor. The seed can be cleaned by carefully pouring it from one box to another in a current of air. A grain fanning mill fitted with screens of different size is preferable, however, and should be used whenever available. In obtaining clean seed of good quality, it is often necessary to blow away what appears to be good seed, but what is actually worthless. The final process of cleaning can often be greatly facilitated if the cones have been screened before drying begins. In this way needles and other foreign matter can be removed at the start.

YIELD OF SEED.

The yield depends upon the quality of the cones, upon the drying and upon the extraction and cleaning of the seed. Douglas Fir should yield 1¼ pounds of clean seed to the bushel. Yellow Pine has frequently yielded as high as 2 pounds to the bushel. If a smaller yield is obtained, it is an indication either that the cones are of inferior quality or that extraction is incomplete. In the case of Lodgepole Pine and Englemann Spruce a yield larger than 1 pound to the bushel can hardly be expected. It is generally less.

SHIPPING AND STORING.

Seed is usually shipped by express. In preparing it for shipment it is placed in strong sacks enclosed in boxes or crates. Labels with the following information should be placed inside the sacks: Species, name of forest, elevation, date and total cost per pound. The boxes or crates should be carefully marked with their destination. Seed should not be kept in a heated room for any length of time. A cool dry place like an unheated cellar or basement is best. To prevent loss by mice, it is usually necessary to hang the sacks from a ceiling by means of hooks or wires.

Past experience in collecting shows that the work has most invariably been started too late. *The best results can only be obtained by planning and arranging the work early in the season, by organizing it on a scale sufficiently large and by prosecuting the work with all* possible energy so as to complete it while the weather is still good and before the slow and expensive artificial drying becomes necessary.

Fire Supervision on the Deerlodge

The scheme of using per diem guards will be given a very thorough try-out this season. Men recommended for such positions should, in every case, be reliable, responsible citizens of the community and have, if possible, at their disposal and under their direction a number of men who can be used as the whole or nucleus of a fire-fighting crew. Each ranger should make it his immediate duty to secure the consent of such men in his district to serve in the capacity of per diem guards and should send into the Anaconda Office, as soon as possible, the name of each man recommended for the position, stating his full name, postoffice address, business, the number of men controlled by him who can be put immediately in the field in case of fire, how he can most quickly be notified in case of fire, his location in or near the forest, together with any other information bearing on the question. As a rule, from three to five such appointees on each district appears to be a desirable number. They should, of course, be distributed over the district as advantageously as possible under the circumstances. The authority of such men will be limited to the handling of fire protection and no other administrative duties whatever will be assigned to them.

The reconnaissance and permanent improvement crews will be used as protective forces to be summoned at any time in case of fire in the region in which they are working, with a possibility that in case the fire season becomes especially bad, the crews will be disintegrated more or less to permit sending individual members to different places to assist in handling or to take charge of fires. The men in such crews will be selected more or less with a view to the possibility of their being used in the capacity just mentioned and men in charge of such crews will be expected to see that the members of the crews understand the principles of fire fighting and the rules laid down in this circular.

Those district rangers who have not already done so should immediately furnish the office with a list of the places where fire fighting tools should be cached in their districts. For each cache the number and kind of tools should be specified.

The following rules should be followed without variation except by special authority from the Supervisor:

Rates:

1. The standard rate of pay shall be 25c per hour with board or 30c per hour if the employee boards himself, as in the case of a rancher or miner, living near the fire. Foremen in charge of crews shall receive 30c per hour and board. This applies only to men in charge of camps and not to so-called "straw bosses" temporarily in charge of a small gang.

Packers shall get $3 per day, cooks $3 per day and cookees $2.50 per day. Cooks pay may be raised somewhat according to the size of the crew and the amount of help he has in the way of cookees, but should in no case exceed $3.50 per day.

2. No fixed amount can be set for hire of pack horses and teams but the standard rate shall be $1 per day for pack horses, the service providing their feed, and $6 per day for man and team, the team to be fed by owner.

Time:

1. When hired at points involving a trip by rail or boat, fare and expenses while en route to points of disembarkation from the railroad will be met by the Service but no time allowed.

To protect the Service, the cost of transportation expenses en route should be deducted on the time slip if the man fails to work for a period of at least ten days, if needed. This rule should apply in case of discharge for inefficiency or other cause except on account of not being needed. Contracts will cover this point, but will not stipulate that no time will be allowed unless service has been rendered for at least 10 days. The form to be used is as follows:

United States Department of Agriculture.
Forest Service.

Waiver.

L, ————————, having been employed by the Forest Service, United States Department of Agriculture, to fight fire on or adjacent to the national forests, in consideration of transportation furnished by the said Forest Service, from the place of employment to the point where my services may be required, and other valuable consideration, do hereby agree to work at least 10 days at such points as I may be assigned, and do hereby agree to have the cost of transportation and expenses en route deducted from the amount due me should I fail to complete 10 days' work, unless said employment be sooner terminated by the officers of the Forest Service because not longer needed.

2. When hired locally, time will be allowed from point at which hired, time to begin when start to fire is made; and when not hired locally time allowed from point of disembarkation on the railroad when start to the fire is made.

3. If the crew walks to the fire, time shall be allowed going in, the time to be fixed by the forest officer in charge, provided, if a man does not work at least two days if needed, his time going in shall not be allowed.

4. If wagon transportation is provided, time going in shall not be allowed.

5. Time will be allowed during subsequent transfers between fires.

6. Men who voluntarily quit or are discharged on account of inefficiency shall have their time and expenses both cease when they quit work.

7. All men who remain on the fire until discharged on account of not being needed will be allowed time walking back from the fire line to the railroad or the point at which hired.

8. Rail transportation shall not be allowed to the point where men are paid off, but the forest officer in charge may secure a ticket for such men as have no money on a Government transportation request making a note of the deduction to be made on the time slip and the number of the transportation request.

9. When at work in the fire camp, time shall be allowed for going to and returning from the fire, provided that the ranger or foreman in charge, sets a time limit for the trip. As a general thing this should be the time in which he himself would make it.

10. Time should be turned in on the regular slips, form 874-15. All entries and signatures should be in ink or indelible pencil. No erasures of any character will be allowed on time slips. Time books of the ordinary type should be used in recording time in the field. To make available a supply of such books by requisition from the Ogden Supply Depot, the matter is now being taken up.

11. All accounts for commissary articles such as tobacco, blankets, shoes, etc., should be entered on the time slip and the amount deducted from the total amount due. The cash receipt should in all cases be signed for the full amount but payment should be made for the actual amount due. It is impossible to make deductions where payments are made by officials' checks. Where necessary to avoid mailing official check, cash payments may be made and a form 4 A sub-voucher taken and submitted for reimbursement on form 4. With the system of payments already outlined to you this should be necessary only in very exceptional cases. Where transportation request is used and a deduction is to be made, the cash receipt, should be made out for the amount on the time slip, minus the deduction, since the Government has already covered the amount due the railroad company with the request as a voucher.

12. In working on fires, twelve hours should be usually considered the maximum time per day. Time should not be allowed for over this amount unless it is impossible to avoid it and then only for short periods. Long shifts running up to 20 hours or more should be held to the extreme minimum. This should usually be not more than one shift of 20 hours or more per week. No hard and fast rule can be allowed in this but the standard above should serve as a guide to hold excessive time to the minimum.

14. In all cases the addresses of the men employed together with the names of the person they wish notified in case of accident should be kept in the time book in the space to be provided for this purpose.

The following list is given as a guide when ordering food supplies for crews of men. This list is a result of long field experience of the U. S. Geological Survey. A ration is the amount of food necessary to subsist one man one day:

Ration List.

Article	Unit	100 Rations
Fresh meat (a)	pounds	100
Cured meat, canned meat, or cheese (b)	pounds	50
Lard	pounds	15
Flour, bread or crackers	pounds	80
Corn meal, cereals, macaroni, sago or corn starch	pounds	15
Baking powder or yeast cakes	pounds	5
Sugar	pounds	40
Molasses	gallon	1
Coffee	pounds	12
Tea, chocolate or cocoa	pounds	2
Milk condensed (c)	cans	10
Butter	pounds	10
Dried fruit (d)	pounds	20
Rice or beans	pounds	20
Potatoes or other fresh vegetables (e)	pounds	100
Canned vegetables	cans	30
Spices	ounces	4
Flavoring extracts	ounces	4
Pepper or mustard	ounces	8
Pickles	quarts	3
vinegar	quarts	1
Salt	pounds	4

(a) Eggs may be substituted for fresh meat in the ration of 8 eggs for one pound of meat.

(b) Fresh meat and cured meat may be interchanged on the basis of 5 pounds of fresh for 2 pounds of cured.

(c) Fresh milk may be substituted for condensed milk in the ratio of quarts of fresh milk for 1 can of condensed.

The above ration list has been drawn up to cover the supplies found necessary for a crew of men permanently in the field. In case of fire fighters, however, it will not usually be necessary to maintain the crew long in the field. Therefore, so far as possible, rations should be supplied which do not require much cooking and which may be carried easily on the fire line. With this object in view, you will probably not, in most cases, need to order any flour, substituting in place of it bread already baked; while canned vegetables will probably be used more largely than appears on the list. You will also probably need more canned milk than 1-10 of a can per ration.

The following list gives the equipment as nearly as can be estimated which will be needed to handle a crew of ten men at a fire:

Equipment 10 Men.

No.	of pieces and article.
2	5-gal. W. Bags.
2	2½-gal. W. Bags..
2	Canvas buckets.
3	12″ Files.
14	Knives.
14	Forks.
14	Tea spoons.
16	Tin or granite plates.
16	Mush bowls.
18	Cups.
2	Milk pans.
1	Dish pan.
4	Fry pans.
10	Table spoons.
4	Stew kettles.
1	Meat fork.
1	Galv. water bucket.
1	Wash basin.
12	Wash towels.
12	Dish towels.
1	8-qt. coffee pot.
1	D. B. axe.
1	Tent, 7x9.
2	Butcher knives.
1	Can opener.
1	Granite stew pan.
1	Large stirring spoon.

As you will note, no means of baking, such as a dutch oven reflector or stove is covered on the list. In very exceptional cases where a fire is burning for a long time, it will probably be desirable to furnish some means for baking.

The following is a list of tools for the use of 10 men.

List of Tools for 10 Fire Fighters.

No.	Article.
4	Axes.
4	Shovels.
6	Mattocks.
1	CC Saw.

For supplying fire crews of more than 10 men it will probably be well to adhere fairly closely to the ratio here given between the different kinds of tools, although it should of course be varied to meet the needs of the situation in each particular case.

In order to secure the best possible use of fire patrol forces, a definite plan of permanent improvement work should be laid out in each district so that at times when weather conditions permit, the rangor may utilize the time of such patrolmen in doing this work.

Each district ranger should bear in mind that he may be instructed at any time by the Supervisor to put on an additional patrolman. For this purpose you should have in mind a number of good men in the vicinity who can be secured for the purpose at short notice. Furthermore, each district ranger should get as many persons as possible in his district to agree to respond to calls to assist in putting out fire and, still better, he should, whenever possible, get them to agree to go with tools and food to put out fires without being summoned.

Tentative arrangements should also be made to secure pack horses, wagons, etc., for use in case of fire so that we may not be forced into a position to be held up as

to prices when we have to take such means of transportation as we can get at any price. The success of the Service in handling the fire situation depends very largely upon the thoroughness and intelligence with which preparations are made in advance. Each district ranger will be held strictly accountable for proper preparations.

Seed-Eating Animals on the Tahoe

A lengthy article dealing with seed-eating animals appeared in the issue of "The Tahoe," the publication of the Tahoe national forest, and it is in part as follows:

In the usual order of things, seed producers and seed consumers are, upon the whole, in harmony. While land is covered with living timber there is a vast amount of seed that cannot possibly develop into mature plants. Such trees as have seeds of any considerable size are thus natural purveyors for seed-eating creatures both in fur and feathers. Many of these creatures have the habit of storing nuts and other seeds, for future consumption, which involves transportation, and it not infrequently happens that, through accident or oversight, seeds are left where they find suitable conditions in which to grow and reproduce their kind. Indeed, trees bearing seeds too heavy to be carried by the wind are distributed mainly through the provident labors of these animals. There is, therefore, normally a kind of interdependence between certain trees and certain animals.

The moment natural conditions are upset, however, this harmony gives place to antagonism. Let a fire reduce the forest to embers and bare earth, and the seed-eaters immediately become opposed to reforestration. Only the arboreal species are banished for more than a few months by a forest fire. The earth dwellers—ground squirrels, chipmunks, and mice—soon return to their old haunts and flourish upon the product of various herbs and deeply rooted shrubs, which spring up and clothe the ground in a single summer. But though they thrive and multiply under new conditions, their noses are ever keen for the scent of nuts.

When it is proposed to reforest a burn by seeding, an essential preliminary is to ascertain what kinds of rodents are upon it, how numerous they are and how they are distributed, in order that adequate steps may be taken for the protection of the seed to be planted. The necessity for this preliminary is made clear by the light of experience.

On a plantation made in the Tahoe forest during the winter following a fire in July, only 40 per cent of the seed spots produced seedlings. This loss was mainly due to Beechy ground squirrels and white-footed mice; yet careful observation and trapping showed the average number of ground squirrels per acre to be only two or three per acre, and of mice to be about six. Had this burn been older there would undoubtedly have been a larger population of rodents upon it.

On a 12-year-old burn in the Black Hills forest 11 mice and 3 chipmunks were trapped on a half acre containing 2,000 seed sprouts. They had taken 70 per cent of the pine seed planted there in six days. One chipmunk was seen to visit 38 seed spots in four minutes. The need of attending to rodents prior to planting does not require further demonstration.

Where rodents are present signs of them can be discovered by scanning the ground, but the species to which they belong and their relative number can best be determined by the use of traps for a day or two. The catapult traps to be had at any hardware store serve every purpose, a dozen mouse traps and as many rat traps being sufficient. For bait, oatmeal or a scrap of bacon rind or, better still, both together, may be used. It is important to note whether the animals are concentrated in favorable situations or are generally distributed, as upon this point hangs the distribution of poisoned grain which is to be employed in exterminating the pests. An excellent poison may be prepared as follows:

Wheat	1 bushel
Water	1 quart
Starch	2 tablespoonfuls
Saccharine	2 teaspoonfuls
Strychnine (pulverized)	2 ounces

Add the starch, saccharine and strychnine to the water, heat to boiling, and stir constantly after the starch begins to thicken. When the starch is fully cooked stir it into the wheat, every kernel of which should be coated. A galvanized iron washtub is an excellent mixing vessel, especially as it is easily cleaned. Either the sulphate or the alkoloid of strychnine may be used.

If rain is imminent and the poisoning cannot be delayed, melted tallow should be substituted for the starch solution as a coating medium. In this case the wheat should first be slightly warmed, the saccharine and strychnine added, and then the tallow applied, in the ratio of a quart to a bushel of wheat.

The putting out of poisoned grain depends entirely upon the number and distribution of the animals for which it is intended. In that part of the Tahoe National Forest near Nevada City, seed-eating rodents are not numerous relatively speaking. The mice are living chiefly about logs and stumps and in old gopher holes, and the ground squirrels are easily located by their burrows. Under such circumstances as these, poison need be put only in places

likely to be frequented by the pests. Wherever there is a general reforestration, however, poison should be dropped every three or four feet along parallel lines five yards apart. For mice and chipmunks 20 kernels in a place are sufficient, but ground squirrels should have a teaspoonful. Poison put on grazing land should be lightly scattered to prevent its being taken by domestic animals.

In deciding on the proper time to lay poison for the protection of seed there are several points to be considered. One of these is the date at which planting is to begin. Another is the habits of the animals aimed at. Mice are active at all seasons, but chipmunks and ground squirrels in the Tahoe forest hibernate during the winter. Again, in winter, quail and grouse feed on buds and seeds, and are in danger of taking bait intended for troublesome mammals. In the warm season this danger disappears. The writer, at different times, has had under observation several hundred acres of land thoroughly treated with poisoned grain in May and June; yet he never knew of one grouse or quail living there to be killed by it.

Fall Work for the Ranger

ORDERS FOR COLLECTION OF SEED, FALL OF 1911.

(Contingent on conditions.)

	lbs.	lbs.
District 1		
Yellow pine	2,000	
Douglas fir	5,000	
Western white pine	15,000	
Lodgepole pine	5,000	27,000
District 2		
Yellow pine	8,000	
Douglas fir	5,000	
Lodgepole pine	10,000	
Engelmann spruce	3,000	26,000
District 3		
Yellow pine	1,000	
Douglas fir	1,000	
Walnut	40,000	
Hickory	40,000	
Oak	20,000	102,000
District 4		
Yellow pine	2,000	
Douglas fir	4,000	
Engelmann spruce	2,000	
Lodgepole pine (from 2)		8,000
District 5		
Sugar pine	2,000	
Yellow pine	2,000	
Bigtree	150	4,150
District 6		
Yellow pine	2,000	
Douglas fir	20,000	
Sitka spruce	2,000	
Western red cedar	300	
Western white pine	500	24,800
		192,300

Area artificially sown or planted in 1910, less than 10,000 acres.

Area artificially sown or planted in 1911, over 20,000 acres.

Area which it is expected to sow or plant in fiscal year 1912, 30,000 acres.

Telephones on the Pecos National Forest

Experiments in the use of the emergency telephone equipment are now well under way on the Pecos Forest. The opportunity to inspect the use of the emergency surface wires resulted in the report that very satisfactory service was given. Two miles of various samples of wire were laid from the Glorieta Ranger Station to the Airline lookout point. These wires were reeled out on horseback from a spool placed on the horn of the saddle. At each half mile the portable test set was cut in and communication established with the Supervisor and District Office at Albuquerque. At the mountain top, which was reached one hour after leaving the station, the mine telephone set was permanently rigged and wired. Communication was at once established with the Supervisor's office 30 miles away and with the District office about 100 miles distant. The portable set was also cut in and worked splendidly even when the distance was increased to an artificial resistance of 30 miles. The tests so far have shown that No. 22 stranded copper wire at about $7.45 a mile will perhaps be the most useful and certainly the most economical. The next size, No. 20 gauge, costs about $20 per mile. This is the wire for which quotations were asked from the Western Electric Co. But no large orders for wire have been placed until the results of the experiments under way in this district shall have become known. The portable test set now weighs 11½ pounds, but this can be readily reduced to 10 pounds by the use of shorter lived batteries (two months) and the more compact assemblage of the equipment. A further reduction can be made to nine pounds by weakening the power of the generator, but this is extremely inadvisable.

STATE FOREST WORK

Sunapee Forest Reserve

It has been found desirable in New Hampshire that private individuals should co-operate with the state in saving portions of the forests which were threatened with destruction. Thus an organization, headed by a Philadelphia man, has just bought up 800 acres of forest land on Mount Sunapee, overlooking Sunapee Lake and the state commission has detailed a forest ranger to look after the tract, and to carry out plans for its development and protection from fire. This particular strip of woodland was threatened with cutting in order that the logs might be ground to pulp in a paper mill. By their action, the private individuals who raised the money for the purchase of the land have saved to themselves and to the state one of the most important scenic features of that section. Mount Sunapee would indeed have been desolate with the woods cut off in the thorough fashion in which paper mills cut them.

The danger which threatened these woods is also threatening any number of other beautiful sections in New Hampshire and Maine. The paper mills are remorseless in their demands. They want all the wood which is available. They do not care anything about the scenery; they do not care anything about conserving the water supply; they do not care about the feelings of summer visitors. All they wish is wood to feed the jaws of their great machines. And one may go through sections of the state mentioned and see how ruthlessly and thoroughly and unscientifically great sections have been cut over. If the state is ever to act it must act quickly. But states are slow. And in the meantime, this action of these people in New Hampshire, in raising a sum of money and purchasing a threatened section, is a shining example of what may be done in other places by other people who are interested in preserving the woods for their own sakes and for the sake of the scenic effect. A little co-operation now on the part of well-to-do private individuals will help to solve the problem until the time comes when states and the Federal Government shall take the action which is really needed.

California's Unique Forest

California, among many other natural wonders, contains a "Stone Forest," This is located in Sonoma county, only a few miles from the little resort of Calistoga Springs. This "forest" consists of a great many petrified trees—all of which are prostrate.

In respect to the great number of petrified trees, and their immense size, the California "stone forest" surpasses that of Arizona. Strange to say, but very little is known about these wonderful Sonoma county petrifactions—so far as the general public is concerned. Many of these trees are of enormous size. The famous "Queen of the Forest" is a pre-historic redwood, about 80 feet lqng, and nearly 12 feet in diameter. It has been broken in several places, and these breaks are as clean as if cut off with a saw. A tree has grown up through one of the breaks and has attained quite a large size. Another giant tree known as the "Monarch" lies near by, which is almost 90 feet long and is without a break. This tree is a fir, and averages 10 feet in diameter. Not far away is another giant son of the forest—a redwood that is about 60 feet feet long and is without a break. This tree broken into many hundreds of pieces, yet it retains its shape almost perfectly. Scattered about for the area of several acres, are many other pieces of petrifaction. So perfect has been the transmutation into stone, that the grain of the wood still remains very clear, and the variety of the tree may be easily determined.

Massachusetts' Plantations

Reforestation work conducted under the State Forester Frank W. Rane, has been suspended for the season. About seven hundred acres have been replanted this summer. The plantings have been made in Ashburnham, Fitchburg, Greenfield, Buckland, Hubbardston, Lancaster, Kingston, Shirley, Attleboro, Paxton and Hopkinton.

This is the third year of this kind of work. Formerly all the planting was done in the spring, but this year the forester divided it up so as to do some of it in the fall. Then the department will plan about three hundred acres more.

Approximately three thousand acres of land, deeded to the state by virtue of purchase or gift, have been replanted since the state started this forestry policy, three years ago, and the first plantings are now in a fine condition. Much more land is available and can be replanted as fast as

appropriations are made for it. This year the cost has been about $8 per acre. It was more at the beginning of the work, and will be less in the future, as the state will be in a position soon to raise all its seedlings at its own nurseries. Up to now it has bought many seedlings both at home and abroad.

Carried along with this work are several state nurseries, the principal one being at Amherst, and out of these State Forester Rane will take most of the trees that are to be planted in the future. Expenses will be reduced when this becomes possible, and it is not improbable that enough plants can be taken out of the nurseries next year to conduct operations on as extensive a scale as at present. With the money the legislature has been appropriating in the past the state has planted about one thousand acres a year for three years and at that rate the nurseries are already able to supply the demands. The forester made an effort this year to have the work broadened, so as to plant several thousand acres a year, but the governor and the legislature have not yet shown any disposition to give their approval.

When the department took stock of the nursery at Amherst it found on hand seedlings worth $7,380 on a conservative wholesale basis. The total expense of the nursery up to that time, May 10, 1911, was $7,971 and for sales the department had taken in $1,132, which have been turned back into the state treasury; trees shipped out in 1910 were valued at $1,851, so that the actual cost of the present $7,382 stock is $4,987.

An inventory at the nursery shows the following stock on hand minus what has been taken out for transplanting this summer:

3-Year transplanted white pine....	36,000
1-Year white pine.....	1,500,000
1-Year Norway spruce.....	1,000,000
2-Year white pine transplanted....	170,000
2-Year white pine heeled in.....	224,000
2-Year white pine shipped.....	440,100
4-Year white pine shipped.....	11,500
4-Year white pine heeledin.....	11,000
3-Year box elder transplanted shipped	3,500
4-Year Norway spruce transplanted shipped	8,500
3-Year black locust transplanted, shipped	11,000
3-Year Catalpa Speciosa shipped...	9,500
3-Year honey locust transplanted shipped	60,000
2-Year white pine seedlings.....	500,000
2-Year red pine seedlings.....	25,000
3-Year white pine transplanted....	1[illegible],900

The above list shows 2,500,000 of white pine and Norway spruce which are only a year old and 500,000 white pine seedlings which are two years old. Out of the total of about fifteen different kinds the department will have about 1,000,000 plants available for transplanting next year, and may not have to buy any outside. Considerable new ground has been seeded to keep the stock up and enlarge it for possible future demands.

Wisconsin Taking Stock

In response to a resolution introduced in the assembly, calling on State Forester Griffith for information regarding the number of acres of land now under option by the state board of forestry, the price to be paid per acre and also the price which has been paid for such lands, the state forester sent a communication to the assembly on Tuesday. In this report he says that the board holds no land under option.

Mr. Griffith included in his report lands which has been purchased from September, 1907, forward. Among the latest and heaviest purchases were 27,252.51 acres of the G. F. Sanborn Lumber Company, Eagle River, at $3.50 per acre; 600 acres of the Buswell Manufacturing and Lumber Company, Wausau, at $2.50 per acre; 640 acres of the Alexander Stewart Lumber Company, Wausau, at $3 per acre, and 1,696 acres of the Yawkey-Bissell Lumber Company at $2.50 per acre.

"All of the above purchases," said Mr. Griffith, "have been completed and fully paid for except the Yawkey-Bissell Lumber Company, the Goodyear Lumber Company and the G. F. Sanborn Lumber Company, which will be completed under land contracts as funds are available."

The total acreage of lands purchased is given at 111,407 acres. Of lands granted to the state by the Federal Government and the Nebegamon Lumber Company there are 24,321 acres, making a total acreage of 133,728 acres.

In conclusion Mr. Griffith said that most of the lands purchased contained valuable young timber, which, if protected from fire, would grow into valuable forests. The average price paid, he said, was $3 per acre, which he considered reasonable considering the location, much of the land bordering on the lakes in the northern part of the State.

He claimed the state forest reserve lands were worth between $1,500,000 and $2,000,000. In order to protect its lands he said it was necessary for the state to secure lands scattered about among the state holdings. Only an ample appropriation for the use of the state board of forestry, he said, would enable the board to do this.

Mr. Griffith said the appropriation granted at this session of the legislature would "largely determine the future success of forestry in Wisconsin." As the assembly last week reduced the appropriation of $200,000 annually recommended by the finance committee to $50,000 the state board will apparently have to go slow for a time.

Vermont Planting Season

Now that the forest planting season has closed the following summary of the nursery stock sold by the state nursery may prove interesting. The total number of trees sold was 463,200, an increase of 85,500 over 1910. These went out to 73 different parties, private owners and corporations. An encouraging awakening occurred on the west side of the state. Whereas Windsor county has formerly led in this enterprise, Rutland county has this year planted the most trees, largely through the activity of the Vermont Marble Company and the Rutland Railway, Light and Power Company. Windsor county ranks second in this respect, the most extensive planting being done by W. D. Woolson, of Springfield; and Windham county is third. Considerable planting was done in Bennington, Essex and Lamoille counties this year, where very little interest has been shown previously. The largest private plantation made this year was that of Dr. William Stanford Stevens, of Enosburg, where about 45,000 trees were planted, part of which had been raised on his farm. Extensive plantations were made also on the state lands in Plainfield and Sharon and by the International Paper Company on its Vermont lands.

Up to the present time the state nursery has been unable to supply the demand for three-year-old trees, but from now on it is expected that practically unlimited orders can be filled, as about 600,000 two-year-old pine seedlings were this year transplanted in the nursery. White pine will continue to be the chief tree raised on the light soil of the Burlington nursery, but at the Sharon nursery, where the soil is somewhat better, it is planned to raise a large supply of Norway spruce. Great loss was suffered during the past winter in both nurseries on account of damage by ice, several hundred thousand seedlings being destroyed.

The forestry interests of Massachusetts are now, according to an observer, facing the most critical situation in their history. It has been said before in print that it is a waste to appropriate additional state's money for reforestation while fires and insect pests continue to destroy the forests. Ten trees are now cut down, owing to the oppressive tree moth-cleaning laws, to one that will ever be planted.

This state's supply of wood for all purposes is in her woods, and not in her shade or ornamental or roadside trees. Consequently the oppressive and so obnoxious tree-moth cleaning laws must be at once modified to bear less heavily on the forest owners, or they will be forced to cut down their trees, for, as the average value of the standing wood as it is in this state is from $20 to $35 per acre (and the cost of cleaning it the first year is over $31 per acre by the state forester's report for 1910) the value of the wood is practically absorbed in the first year's cost of cleaning it. Therefore, the woodland owner must spend his money in destroying his forest before cleaning it at all, to prevent his being robbed of its whole value.

The Government's representative of the bureau of entymology in Boston says in his last report, issued August 13, 1910: "In eastern Massachusetts and southern New Hampshire there are large areas of forest lands which are covered with an inferior growth of trees and which are badly infested. In most cases the cost of cleaning up such areas would be more than the value of the property." This statement practically shows that it does not pay to clean forest lands of tree-moth insects, and corresponds with the statement said to have been made by this state's former superintendent of gypsy and brown-tail moth cleaning work. Mr. Kirkland, who was a great expert in that direction, said that he "could do practically nothing about properly cleaning forest lands."

Mr. D. M. Rogers, special Government field agent, is reported to have said of forest lands that "they are a loss to the owner practically in any event; for if he holds on to and cares for them, the expense is as much as the standing wood on them is worth. If he doesn't take care of them the moths will surely kill them." This proves that the sooner a forest owner eats down all of his woods the more money he will make or save. Mr. Rogers is also reported to have said that $31 per acre for the first cleaning was as cheaply as it could be done.

The average woodland owner does not care a particle about scientific reforestation and ordinarily has no time or inclination to carry it on under the existing oppressive tree-moth cleaning laws and the constant meddling of moth cleaning officials with the trees on his lands.

All the woodland owner has in mind is the cash value of his standing wood, and so he wants to have his trees and his property let alone by the officials and the laws. The more rigidly the cleaning laws are enforced and the more personal and sectional favoritism there is shown, the faster the woods will be cut down by their angry owners, and more fires must result; for as its does not pay the owner of the woodland to clean the standing wood, it surely will not pay him to clean the moths off the bushes, and so he must burn such brushland over every six months to kill these bushes to prevent the leaves from growing at all in order to stop the moths nesting, and therefore greater forest fires must result from such burnings in the future than in the past.

It is estimated that it would cost from five to ten million dollars annually to clean up at all thoroughly the whole of the forest brush, and new-growth land in this state.

It is ridiculous to try and keep up the arbor day practice of planting new trees, with the destruction of old trees to new plantings going on in the ratio of 10 or more to one.

Destruction of the forests by their oppressed owners means a rapid loss of the wood pulp supply for newspaper use and the wood supply for all kinds of commercial and domestic purposes, with the resultant drought, with no fish in the streams, as there will be but little water in them; and no game in the woods, because there will be not forest for the game to hide in.

There must be no discrimination in favor of country as against city woodlands, or else woods in the cities, where they are the most necessary and appreciated, will all be destroyed before those in the country are cut down. Right here in Boston prominent people are refusing to plant shade trees about their residences because they will be obliged to clean them of tree-moths. This, of course, greatly injures the tree nursery business, as the woodland owner cannot afford to clean his trees and doesn't care whether the moths kill them or not; for if he is saved the, to him, wasteful expense of cleaning them, he can still use them for firewood at least, and perhaps other purposes just as well as if they were alive, and so the argument that if he doesn't clean his trees they will be killed, has not the slightest effect to cause him to clean them, as it has been previously clearly shown that it will not pay him to do so.

Therefore, no further appropriations of any sums of public money for reforestration or for tree-moth cleaning should be made in this state until the tree-moth cleaning laws are so modified as to prevent the owners from being forced to cut down their woodlands, owing to the legal right of the authorities to force upon them the cost of any such cleaning.

All the woodland owners, together with the farm owners throughout every state, should at once join together in an active campaign before the coming primary elections and oblige each candidate of every party to publicly declare whether or not he will use all his efforts to have the present tree-moth laws so modified that the tree-owners will no longer be oppressed or forced to clean their trees, or any tax or other charge at all for any cleaning be forced upon them.

Illinois

A bulletin on "Forest Conditions in Illinois," recently issued by the State Laboratory of Natural History, cooperating with the United States Forest Service, shows that about 2,000,000 acres, or about five and one half per cent of the land area of the state is forest, chiefly in the southern part of the state or near streams, and about ninety per cent is owned by farmers.

The bottom lands of the Wabash and Ohio rivers formerly contained the largest hardwood trees found in the United States. Nearly 100 kinds grew in these forests and giant sycamores and tulip trees were estimated to reach a height of about 200 feet. Little remains of these virgin forests, and nothing has been done to assure future growth of such timber.

In addition to these bottomland forests, in the southern part of the state, there are also those of the hills and of the upland plains. The hill forests are composed mainly of oak and hickory, supplemented by a variety of secondary kinds—walnut, maple, beech, red gum, tulip and cucumber trees; while the upland plains forests consist of a preponderance of oaks, intermingled with hickories or on wet grounds with post oak.

The forests of the northern part of the state are mainly confined to the vicinity of streams; and some few counties that were almost completely forested as Calhoun and Jo Daviess are not much cut over. The lowland forests of the northern parts are composed of elm, cottonwood, birch, oak, willow, and sycamore, and the upland forests of oak, hickories, cottonwood, red elm, cherry and rarely aspen, black birch, paper birch and white pine.

The present forest products are varied including lumber, railway ties, mine timbers, cooperage supplies, box materials, charcoal, fence posts, fire wood and nuts. It is advised that every well-managed farm should have its wood lot just as it should have its vegetable and fruit garden, and for the same kind of reasons it should be cared for to insure a future crop.

A recommendation is made that a state board of forestry be created, a state forester appointed, forest lands purchased for demonstration purposes, and a force of fire wardens organized.

NEWS AND NOTES

Canadian Forest Products

The output of sawn lumber in Canada, according to a report just issued by the forestry branch of the Department of the Interior, was 3,348,176,000 feet in 1908 and 3,814,942,000 in 1909. Oak, hickory and walnut, all of which were once cut into lumber in parts of Canada, have been exhausted, and figure now as "other woods," such trees as are marketed being taken from the uncleared portions of farms in the older settled districts. The "soft woods" are the mainstay of the industry, spruce leading in quantity, though not in value. This is followed in order of quantity by white pine, Douglas fir, hemlock, cedar, and red pine. In values for 1909, calculated at mill prices, white pine, $22,563,447, led all the rest. Next came spruce, $16,365,720; Douglas fir, $6,850,579; hemlock, $3,577,372; cedar, $2,645,379; red pine, $2,777,734; balsam, $1,170,840; larch or tamarack, $1,027,344; birch, $990,393; maple, $729,162; basswood, $836,602; elm, $582,999; jack pine, $404,586; yellow pine, $345,710; ash, $315,367; beech, $216,052; poplar, $101,200; oak, $199,205; hickory, $22,100; walnut, $2,440. Of the provinces Ontario leads in value of product, because of its white pine; Quebec has the heaviest output of spruce; and British Columbia of fir and cedar.

Of poles there were purchased by telegraph, telephone, electric light and power, and steam railway companies operating in Canada during 1909, 358,255, valued at the point of purchase at $497,052. This was nearly double the quantity used in 1908. An increased number of short cedar poles was used, bringing the average price down from $1.53 in 1908 to $1.39 in 1909. Of the poles purchased 338,366 were cedar, the remainder being of larch, spruce, Douglas fir, and others unspecified.

One hundred and twenty-eight cooperage firms reported to the department. The total value of stock manufactured in 1909 was $1,842,235, of which $247,116, or 13.4 per cent of the total was tight cooperage and the remainder slack cooperage.

The reported consumption of lumber for boxes and box shooks for the whole of Canada in 1909 was 82,972,000 feet, valued at $1,264,376. This was used by sixty firms, of which 25 were in Ontario, using 30.3 per cent and 22 in Quebec, using 41.5 per cent. The average value of this box material was $15.24 per thousand feet. These returns represent about sixty per cent of the lumber used by the box manufacturers of Canada, as they do not include the large quantities used by shippers of bulky freight of varying size, who find it more profitable to manufacture their own crates and packages.

A writer in the *Boston Transcript* recently reviewed in optimistic vein the forestry situation in Maine, holding that its timber operators have developed a conservative system of cropping which is fast gaining adherents and that the state is in no danger of losing its forest resources. What is being accomplished in Maine is by private owners, the state having done practically nothing. This writer says:

"It is a simple problem in invested capital. A company which has sunk two millions in a pulp manufacturing plant on a certain stream, with big holdings of forest at its headwaters learns that an expert forester affirms wasteful cutting to be not only beggaring the land, but drying the watercourse. He appears to be telling the truth. He is called in to look us over. We are told that we are on the direct route to put our plant out of business in a period which can be reckoned to the month, but that it is not too late to change. We change. This, in brief, is the history of timber conservation in Maine.

Directly the owners began to make their contracts more strict, independent landowners and companies with large holdings discovered this means of prolonging the yield of their tracts and reducing the waste of cutting to a minimum. By explicit terms in the contract between owners and "operators," the cutters are obliged to observe certain rules in the economy of timber. By a system of inspection, often performed by experienced foresters, the owners are kept informed of whether these agreements are kept. If they are not, the operators are fined by being charged "double stumpage"—i. e., the price the operator pays the owner for the privilege of cutting, the amount of which is determined by a scale which gives the quantity of lumber by board feet. Thus the whole matter is managed without special legislation; the privilege of cutting is eagerly sought, and by the terms of the contract the owner may impose the fine for breach of agreement.

This programme is very different from the old system when woodsmen went into

the forest, selected only the big trees, cut them with a high stump, threw away all the upper branches, using only the stem, and wasted easily one-half of the tree. Now they are obliged to begin low on the trunks and to "work up" all of the tree that can be used. There is almost no waste.

The large companies are cutting more strictly. They have been brought to realize that wood pulp has come to stay as an article of commerce and that their plants must be fed not only next year but twenty years hence. Many of them hire trained foresters, as a farmer hires farm hands, and all of them employ expert woodsmen. Certain companies have engaged foresters to go into the woods and block whole regions into sections of one square mile. The quantity of timber on each of these 640-acre tracts is accurately estimated; its boundaries are blazed lines with marked cedar posts at their intersections; and that square mile is sure of intelligent cutting.

Few realize the vast extent of virgin forest which remains in Maine. Most of it has been notched along the watercourses, but nothing more. It was the custom in years past to cut along the water courses up the big rivers and smaller brooks, choosing only the timber which could easily be "toted" to the stream and brought down on spring freshets. But farther in these tracts there are miles of untouched trees as sound and tall as ever grew in Maine. These lands, thanks to the blocking system, will be cut economically. This economy has been learned in good season. The Bangor & Aroostook Railroad projects a new line through the heart of this unopened country to be called the "Allegash Extension." There is every indication that this will be built within a few years, and when it is quickened lumber activity and the opening of extensive and fertile farm lands is sure to follow. There is good reason to suppose that this development will be made wisely, thoroughly and consistently. A few years ago one could not have been so sure of this. The proposed Allegash Extension is a chapter by itself—of Maine politics, of railroad enterprise in the state, of the development of Maine's peculiar resources. The point at present is that whatever is done to the timber lands in consequence of its building will probably be done with a view to conservation of these resources.

Economy in cutting has been supplemented in Maine by the economy, equally important, of protection against forest fires. The records of the past few years tell their own story. Weather conditions in the spring of 1907, as most of us remember, were abnormal. It was the wettest season in years, rain following rain in an almost perpetual drizzle. The dampness continued most of the season and the loss by forest fires was only $14,567. The season of 1908 was as abnormal the other way: It will be remembered as the driest year in a decade or more. The drought began early in May and lasted until October 27. Of this period were only three weeks when forest fires would not run. With the utmost vigilance and much hard fighting the forest wardens kept the loss down to an estimate of $618,816, and the area burned was less than one per cent of the wooded land of the state. In 1909 came the first real test of Maine's forest fire protection. The appropriation had been more than trebled ($64,000), making possible more frequent patrols and lookouts. The estimate of damage dropped to $96,699. Last year it was only $2,841. The United States Government has copied Maine's system for preventing forest fires.

When we consider that this whole campaign of conservation and economical forestry dates back to 1902, it is to see that the country is not, after all, so slow to "catch on." In 1902 the first scientific forestry in Maine was begun by the United States for the Great Northern Paper Company. Three years later the field was entered by independent foresters, practising for private owners. It is only fair to add that no mean share of the missionary work was done by the Federation of Women's Clubs, which established a chair of forestry at the State University.

Maine has lost her merchant fleet and her ship-building industry, but she keeps her forests and by the present programme she will keep them. Last year 637,000,000 feet of lumber was cut, which is about the average, though this amount is increasing. Maine is learning to raise her annual crop of timber as a farmer raises potatoes or corn."

Cooperation with Lumbermen in New York

Commissioner Osborne, of New York, has undertaken to inaugurate closer cooperation with the lumbermen to check waste and promote reforestation. The commissioner sent Superintendent of State Forests Pettis and others of the state force, by arrangement with the company, on to a tract of 80,000 acres in St. Lawrence county, recently purchased by the Emporium Lumber Company of Buffalo. The state foresters will make an examination of the soil and ascertain the varieties of trees which are supported by it. As a result of this investigation by the foresters, the company will receive gratuitous expert advice as to which trees should be cut and which left standing with information along reforesting lines. In this way the state department will attempt to exert an influence to prevent operations that are wasteful and destructive of the forests.

The Pennsylvania Railroad and Reforestation

The forester of the Pennsylvania Railroad has issued his report for the year 1910, and it shows that since the company undertook forestry work on a comprehensive scale, 4,000,000 trees have been set out. Last year 617,338 trees were set in permanent locations on tracts of land adjacent to the company's right of way.

The forestry operations of the company extend to all points on the lines east of Pittsburg and Erie. During last year 650 acres of idle land were set out in hardwood and evergreen seedling trees supplied by the company's own nursery at Morrisville, Pa. There were 200,000 trees planted on several of the company's properties at Altoona, 49,189 in the vicinity of Mount Union, 93,700 near Martic Forge, 65,500 at Newton Hamilton, 62,249 at Petersburg, 36,100 near Middletown, 12,000 at Vineyard, 10,000 at Ryde, 27,750 at Rambo, 5,000 at Conewago, 3,500 at Kinzer, 17,250 at New Brunswick, N. J., and 25,100 at Parkton, Md.

There were 32½ acres of land at Morrisville, Pa., devoted to nursery purposes, which afford a capacity of one million trees per year. To replace the seedling trees transferred last year to their permanent locations required the planting of 269 bushels of acorns and 116 pounds of seeds from coniferous trees. The total output of the company's nursery during the year was 766,924 trees. The stock on hand at the nursery at the close of the year was nearly one and one-half million forest trees, varying in age from eight months to four years, and 137,200 ornamental plants.

With a view to beautifying the lawns around stations and unoccupied places along the roadway much attention has been paid to the growing of ornamental plants and trees at the company's nursery. To save much of the time required to grow these from seed, there were imported from France during the year 41,696 deciduous ornamental plants, 5,480 coniferous ornamental trees and 107,935 coniferous forest seedlings. These were placed in beds at the nursery and will be ready for transplanting this year.

In addition to growing ornamental shrubbery and trees with a view to future requirements for ties and lumber, the Pennsylvania has established two large tie and timber treating plants, both using the pressure treatment, one at Mt. Union and the other at Greenwich Point, Philadelphia. These plants have a combined capacity per year of one and one-half million ties or their equivalent. The Mt. Union plant was in operation the entire year, while the one at Greenwich Point was placed in service July 1. In 1910 there were treated 671,369 ties, as well as four and one-half million feet of lumber and switch timbers, 5,432 fence posts, 10,592 cross-arms, 55,212 lineal feet of poles, and 90,306 paving blocks. To do this required 2,866,513 gallons of creosote, all of which was imported from Europe.

Old-Time Forest Waste

A remarkably shrewd forecast of the course of events in the United States for more than a century is to be found in the notes of the German traveler Johann David Schoepf, who visited the United States in 1783-1784, beginning his travels, indeed, before peace with England was ratified. Schoepf was a highly intelligent and well-educated man, with a sound scientific equipment, who held many posts of public trust, and at his death in 1800 he was president of the United Medical College of Ansbach and Bayreuth. Perhaps none of the distinguished Europeans who traveled in the United States in those first years was better equipped to form an intelligent opinion and the book which he published upon his return is of uncommon interest and value. Probably few Americans have ever seen it, and Willis J. Campbell of Philadelphia has done a useful service by publishing it in an English translation by Alfred J. Morrison.

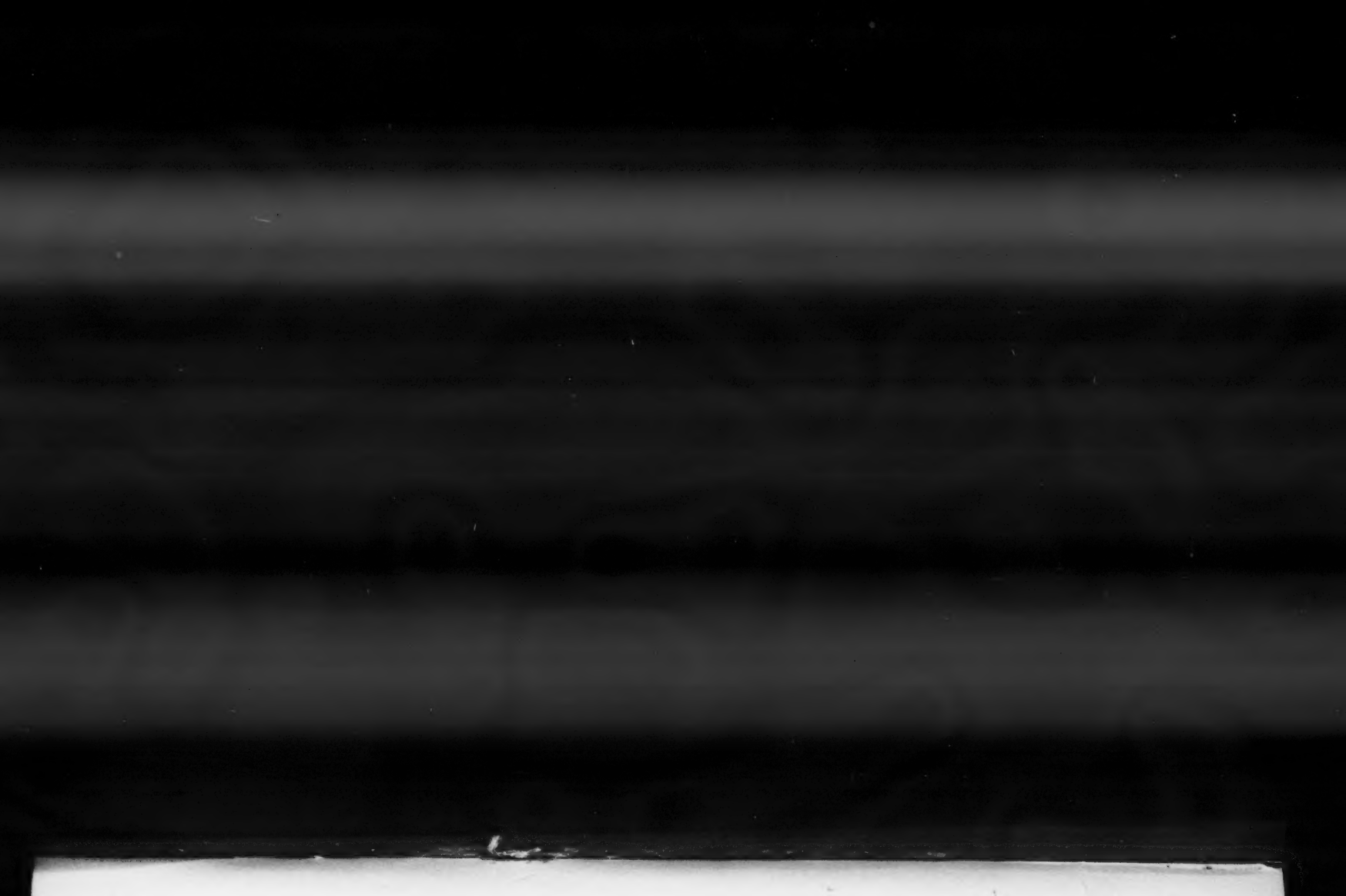
Schoepf was a trained student of forestry, and he was shocked at the waste of valuable timber in America: "Not the least economy is observed with regard to forests." The owners of foundries, which then burned wood, usually held great tracts of timber, which was cut without any system or order. The Union, a high furnace in New Jersey, exhausted a forest of nearly 20,000 acres in about twelve to fifteen years, and the works had to be abandoned for lack of wood: "If it does not fortunately happen that rich coal mines are discovered, enabling such works to be carried on, as in England, with coal, it will go ill with them later on." Wherever he went, his eyes were on the forests; as he says: "What I saw every day and in the greatest number was trees." But while most Americans of that day were convinced of the inexhaustibility of the natural resources of the country, Schoepf, with the longer views which his scientific education gave him, looked less at the total mass than at the rate of waste. The destructiveness and improvidence of the Americans appalled him, yet he was quite able to comprehend it and explain it to his European readers—his book, indeed, is admirably just and friendly in tone, resembling Humboldt's books in this respect, though he has not Humboldt's finished style.

FORESTRY ORGANIZATIONS

State and Local

This list is made up from the latest obtainable information. Corrections will be carefully recorded. Those associations marked with a * have made no recent returns and the data given are not vouched for.

Name of Organization	*Secretary*	*Address*
Appalachian Mountain Club	R. B. Lawrence	Tremont Bldg., Bos.
Arizona:		
Salt River Valley Water Users' Association.*	Charles A. Van der Veer	Phoenix.
California:		
Water and Forest Association	I. C. Friedlander	1405 The Merchants Exchange Bldg., San Francisco.
Forestry Educational Association*	E. C. Damon	San Diego.
Sierra Club	William E. Colby	San Francisco.
Pacific Coast Forest, Fish and Game Association.*	Wm. Greer Harrison	San Francisco.
Tri-counties Reforestation Committee	Miss C. J. Jensen	Riverside.
Colorado Forestry Association	Ellsworth Bethel	Denver.
Connecticut Forestry Association	P. H. Stadtmüller	Elmwood.
Georgia Forest Association	Alfred Akerman	Athens.
Indiana Forestry Association	George B. Lockwood	Marion.
Iowa Park and Forestry Association	Welsey Greene	Des Moines.
Louisiana Forestry Association	Mrs. A. B. Avery	254 Stoner Avenue, Shreveport.
Maine Forestry Association	Edgar E. Ring	Augusta.
Massachusetts Forestry Association	Irving T. Guild	4 Joy St., Boston.
Michigan Forestry Association	H. G. Stevens (Asst. Secy.).	525 Bank Chambers, Detroit.
Minnesota Forestry Association	E. G. Cheyney	St. Anthony Park.
Nebraska Park and Forestry Association	Miss Leila B. Craig	York.
Society for the Protection of New Hampshire Forests.	Allen Hollis	Concord, N. H.
New York:		
Forestry, Water Storage and Manufacturing Association of the State of New York.	Chester W. Lyman	30 Broad St., New York.
Northern New York Forestry Association*	O. B. Trappan, Director.	Potsdam, N. Y.
New York State, Fish, Game and Forest League.	L. C. Andrews	Elmira.
The Association for the Protection of the Adirondacks.	E. H. Hall	Tribune Bldg., New York City.
North Dakota State Sylvaton Society*	Miss Ella J. Mitchell	Penn.
Ohio:		
Cincinnati Forest and Improvement Association.*	Adolph Leue	127 West Twelfth St., Cincinnati.
Ohio State Forestry Society	Prof. J. J. Crumley	Wooster.
Oregon Conservation Association	A. B. Wastell	904 Lewis Bldg., Portland.
Pennsylvania:		
Franklin Forestry Society*	W. G. Bowers	Chambersburg.
Pennsylvania Forestry Association	F. L. Bitler	1012 Walnut St., Philadelphia.
Forestry Association of Vermont	Ernest Hitchcock	Pittsford.
Washington Conservation Association*	Clarence H. Bailey	P. O. Box 236, Seattle.
West Virginia Forestry Association	A. W. Nolan	Morgantown.



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